DEKTEC AUTOMATIC EQUIPMENT CO., LTD
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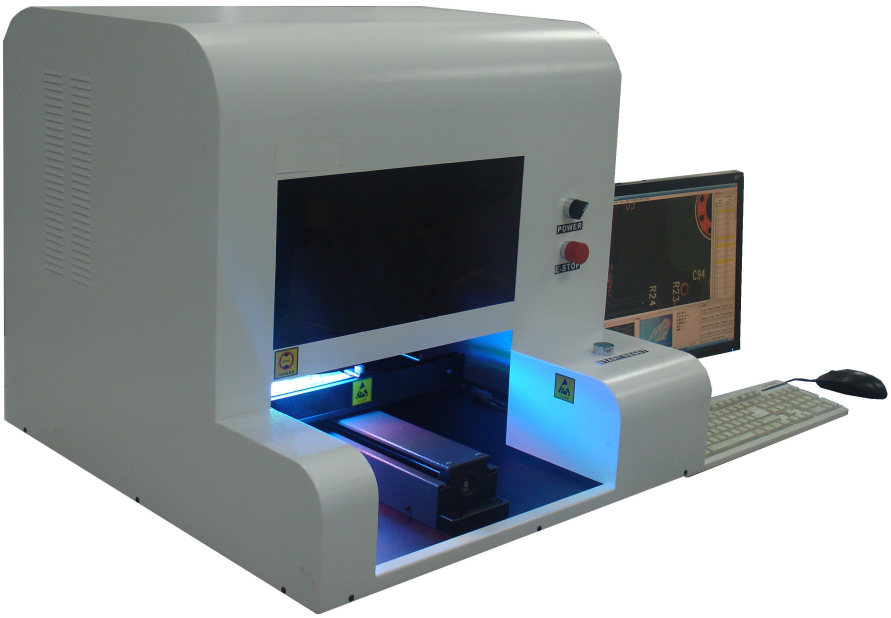
DEKTEC Automatic Optic Inspection
User Manual

Model OK-S350



2009 Edition
For Software 1.0 Version

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Meaning Of Notices And Warnings On The Machine

This means important module, handled only by professionals.

This is a warning, means danger possible to cause wound or death

This is a warning, means no foreign object should enter when machine is running, otherwise it could cause physical wound or machine damage.

PCB 限制高度

This is a warning, means height of object should be within the minimum height to avoid both object and/or machine damage.

Thanks for purchasing and using our products.
Professional training is also provided if the product is purchased.

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Important Information

Warranty

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Information provided in this manual may change without prior notice from the company. Direct or indirect loss due to modification of this manual will not be answered for by DEKTEC.
DEKTEC is not responsible for any damage caused by user' s negligence such as, using inappropriate setting or placing the machine in an unsuitable environment.
We try our best to provide correct information in the document. If you find any detect, neglect or unjustifiable content in it, please inform us. We would be very grateful for you help.

This operating manual has two aims:

To describe safety of this machine.
To introduce machine operation to the user.

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Chapter 1 Safety

1.1 General Statement

To use this machine safely and correctly, user should not only follow the preventive safety measures specified in this manual, but also abide by general safety criterions. Please read the danger warning and notice in this manual and/or on the machine carefully.

1.2 Operator Qualification

Only those who are trained and are qualified operators can run, modify, maintain and/or fix this machine.

Training levels are defined, as below:

- Operator level
- User level or Super user level
- Maintenance man or Repairman level

1.3 Basic Safety Regulation

- Do not use this machine in dusty place or in environment with inflammable gas.
- Anyone mentioned here maintaining the machine (PPE) should follow description from manufacturer.

1.4 Safety Standard

The safety of this machine is based on special industry standard (international law, rules or standard).

1.5 Danger, Warning and Notice

⚠ **Danger**
This means death or grievous bodily harm will be caused if instruction is not followed.

⚠ **Warning**
This means death or grievous bodily harm may be caused if instruction is not followed.

⚠ **Notice**
This means bodily harm or equipment damage may be caused if instruction is not followed. Also used to remind user or operator to avoid unsafe operation.

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1.6 Responsibility

DEKTEC is not responsible for any damage caused by user's operation of the machine outside the instruction provided in this manual.

1.7 Where to put this manual

Keep this manual near to the machine, so user can read important information.

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Chapter 2 Introduction to AOI Technology

The Automatic Optic Inspection（AOI）is mainly used to identify and recognize component or soldering defects during Surface Mounting Technology (SMT) manufacturing process.

2.1 Origin of AOI

These days, the function of electric products is more and more complicated, but the size of these products is getting smaller and smaller. To fit with this trend, circuit board, the core of modern electric products, are almost all manufactured through Surface Mounted Technology（SMT）. Circuit board produced though SMT is called Printed Circuit Board（PCB），on which the density of parts/components are higher and higher，and size is smaller and smaller. The 0402 components, even the 0201 components（0.50 mm×0.25 mm）， are becoming new standard components in the surface mounting industry. And distance between lead of integrate circuit (IC) is reduced to 0.2 mm. This trend has brought the challenge to manual PCB inspection. Automatic Optic Inspection（AOI）is a new optic- mechanic-electric incorporated high technology, which appeared in this challenge. Though image capturing and analysis on PCB, it's possible to identify and recognize those components or attachment with detect. Compared with manual inspection, AOI has higher speed, higher accuracy and higher repeatability. Further more, it can also provide faster and more exact feed back information for the manufacturing process, which can help to better product quality, reduce the production cost, and accelerate production speed.

Usually, AOI equipment has two styles, the in-line model and desktop model. The in-line pattern AOI can be put after the soldering machine to inspect the quality of solder printing, after the chip mounter to inspect the quality of picking and placing, and after the reflow soldering systems to inspect the quality of attachment. The desk-top pattern AOI equipment needs an operator to put the PCB to the equipment manually, and is usually used to inspect soldered PSB.

2.2 Technical theory of AOI

The image capturing of AOI can be divided into two styles, snapping style and

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scanning style. In the snapping style, the camera moves step by step, and in every step only one picture of a small area square on the PCB surface is captured. After several times of image capturing, the image collecting process is finally finished. In the scanning style, the image collecting process just needs one continuous scanning.

AOI equipment can be divided into 2-dimensional, 2.5-dimensional and 3 –dimensional inspection equipments, according to the number of cameras and how the light resource is positioned. In 2-dimensional AOI equipment, the axis of the lens on the camera is vertical to the PCB, and there is no directional light, so only a little 3-dimentional information is included in the captured image, which makes it difficult to inspect soldering detects. In 2.5-dementional AOI equipment, the axis of the lens on the camera is also vertical to the PCB, but because light in the equipment is extra directional, the captured image gains more 3-dimensional information, which can help to inspect out more types of soldering detects. And in 3-demensional AOI equipment, numbers of cameras are used to capture images from different directions, and every captured image includes more 3-dimensional information. If pictures are manipulated very well, the 3-dimensional AOI equipment can be the most effective for inspection of soldering detects.

The key technology of AOI is the image identification system, which is mainly composed of image-identifying arithmetic and normal images. By comparing the to-be-inspected image and the normal image and calculating the correlation, the AOI equipment can identify the status of the components on the PCB, as shown in the sketch map below.

Figure 2.1

Presently, the most used image-identifying arithmetic is grayscale correlation arithmetic, which quantifies the correlation between the to-be-inspected image and the normal image, via calculating the normalized grayscale correlation.
The value of grayscale correlation is between 0 and 1, where 1 predicates the two images are totally the same, but 0, absolutely different. Usually a limit is set, e.g. 0.65, to decide whether the image has been changed or not. Those of which the

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grayscale correlation is higher than or equal to the threshold are to be considered normal, but others of which the grayscale correlation is lower, abnormal.

The operating process of AOI equipment has two segments, the training process and the inspection process. During the training process, the AOI control software captures and collects the normal images and trains the code names, positions, codes and polarities of the normal components on the normal PCBs, and finally an inspecting program is built and saved. During the inspection process, the AOI software captures and collects the images of to-be-inspected PCBs, identifies and discriminates each components and the attachment according to the inspecting program built in the training process, and finally records the inspection result and reports it to the operator.
PCB inspection needs at least one training process to build the inspecting program, so that the inspection process can be executed.

2.3 Technical features of Ok AOI

1) Strong Inspection Capability

Ok AOI adopts independently developed normalized color correlation arithmetic instead of commonly used grayscale correlation arithmetic, utilizes the full RGB color information to achieve better inspection accuracy and stability. Compared with the grayscale correlation arithmetic, the color correlation arithmetic needs twice more information data, which may lower the speed for twice of that of the former. But with the MMX technology specially developed for multimedia application, the Ok AOI can search and gain more information from images within the same or even less time. Color correlation arithmetic can also identify color-marked components, e.g. capacitors, which are but difficult for grayscale correlation arithmetic.

By setting the light, Ok AOI differentiates the images with excess or insufficient attachment and normal image, and inspects and finds out soldering detect.

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Soldering inspecting arithmetic of OK AOI has the features of high inspection veracity and low inspecting mistaking ratio.

Attachment inspecting arithmetic of Ok AO I relies far less on the absolute position of attachment, which betters its inspection effect under the same even lower positioning precision, compared with other generic products.

2) Strong Self-training Ability

Any size or type of component can be trained, by drawing a box surrounding the component, and no special treatment is needed. Ok AOI will finish feature extractions, algorithm selections, and parameter settings automatically. Attachment inspection for resistors, capacitors and lead inspection for IC components are almost self- trained, relieving programmers of all the tedious work. Programming can usually be completed in less than 0.5 hours. Inspection arithmetic of Ok AOI is easy for operation, no parameter adjustment and/or special debugging process is needed.

Ok AOI software keeps training new templates during inspection, and boards with wrong components can be used during the training process, so no special “Golden Board” is required for initial programming. During the training process, Ok AOI will inspect the PCBs and find out detects on the boards， which can help to debug the new boards in product line.

3) Strong Information Collecting and Sharing Ability

Ok AOI saves the detect information found out during the inspection process into a database. With Ok SPC Module of the software, managers and technicians can accurately train the real-time manufacturing condition in MST product line, and estimate and take action on any kind of abnormal phenomenon.

Using the Ok maintaining workstation, the maintenance man can quickly find out the position information about a wrong PCB within its image, by scanning the serial number on the barcode with barcode-scanner.

4) Simple Brief Software Interface

Simple and brief software interface and detailed help files facilitate users’ operation of Ok AOI during the inspection proce ss. Familiar windows drag and drop user interfaces greatly reduce training time. Operator trainings are generally less than 4

hours, and programmer trainings are generally less than 8 days.

5) Suitable For All Kinds of Production Environment

Only XY coordinates information and BOM file or just printout from pick and place machines are needed to train. There is no need for complicated conversion and to set up and maintain components libraries or packaging libraries. Very suitable for complicated SMT product lines.

2.4 Basic Concepts and Terms

Training Operation

To capture image of normal PSBs which will be used as template in inspection operation.

Inspection Operation

To capture and collect images of current PSBs for inspection operation.

PCB file (.DAT file)

Built during Training Operation and all data for PCB inspection are included. Users can do Creating, Opening, Saving and Saving As operation as what they do with MS Word. PCB file is composed of a “filename.dat” file and a folder with name “filename”.

CAD File

Document with information including part code, name, position, etc., saved during PCB manufacture.

Import CAD

To utilize information in CAD files to achieve fast training operation.

Fiducial

Usually a PCB has 2 to 4 fiducials，which are used to orientate the PCB well during manufacture. AOI also uses the fiducials to orientate the PCB. Since the relative position between fiducials and components are stable, positions of parts or components can also be calculated out.

【Notes】 *Better to choose those image with particular and stable features as fiducials.*

Searching Area

An area in the component image with normal template component as center

Inspecting Threshold

The lowest value with which component inspection can pass.

Component

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Electronic units on PCBs.

Part

Components of the same class.

Template

A model built in training process.

Component Template

An image template of a component built in training process.

Part Template

Template of components in the same class.

Administrator

User having the right of training, inspecting, and adding and deleting users.

Operator:

User having only inspecting right.

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Chapter 2 Instroduction to Ok S350

3.1 Machine Components

1) Main body of AOI:
- ■ XY-Axis Servo Driver System: Adopt imported servo motor and controller
- ■ Motion Control System
- ■ CMOS/CCD imaging system with 3 million pixels
- ■ Annular LED light resource
- ■ Host Supporting Frame

2) Image Processing Center, including Host computer, Monitor, Keyboard, Mouse
3) Optional Assemblies：Out Printing Unit(for inspection result printing), Maintaining Workstation

3.2 Hardware Connection Sketch Map

■ **How to Connect**

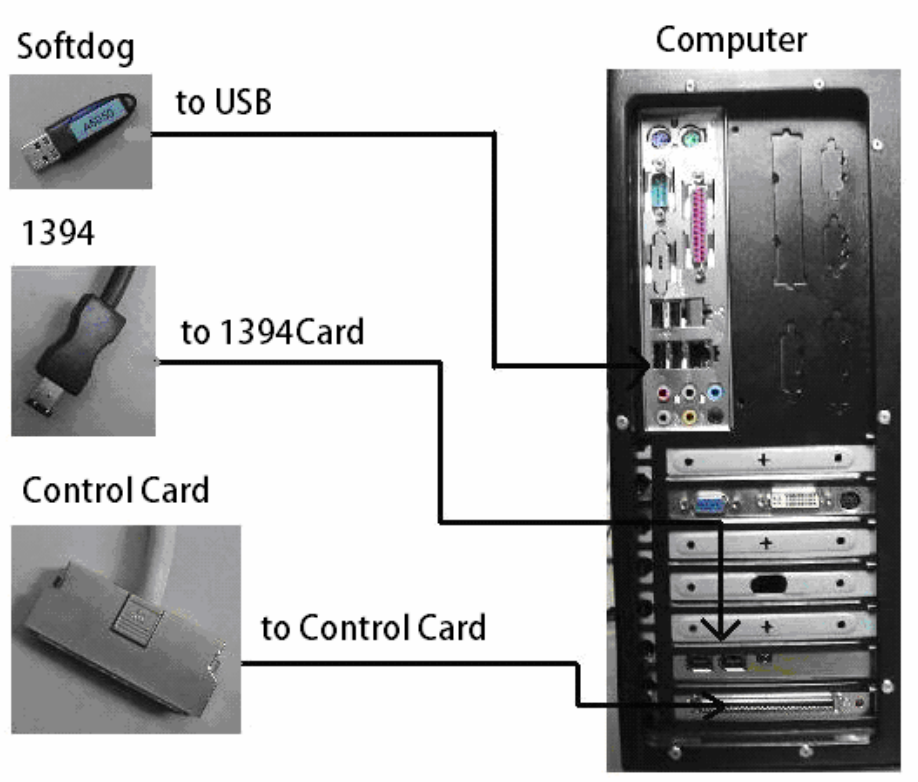

Figure 3-1

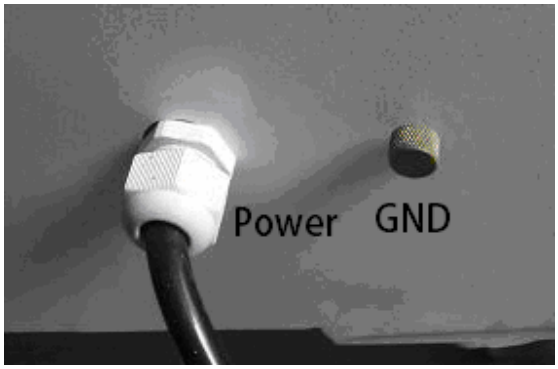

Figure 3-2

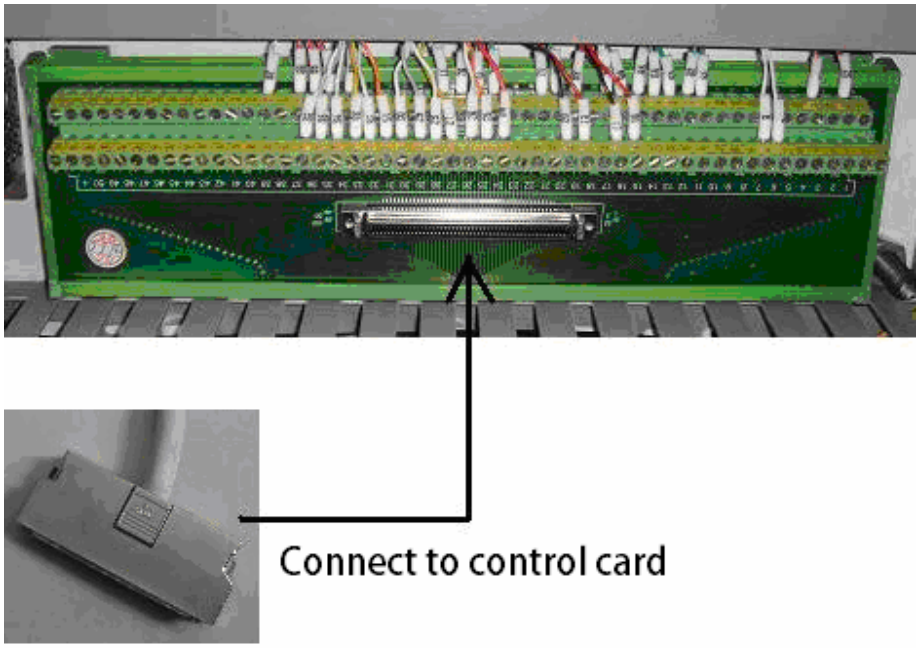

Figure 3-3

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Chapter 4 Equipment Installation and Maintenance

4.1 Plane Adjustment and Supporting Pad Regulation

When the machine arrives, user can set down the supporting pads and with the help of a gradienter (or other tools) regulate the supporting pads till the station is on a flat surface, and decrease its libration. (A proper plane adjustment can allow the equipment perform well with low noise and a long life.)

4.2 Camera Parameters

Warning: Precious module, setting unavailable for laypeople. Unsuitable Setting may cause fatal detect to the AOI.

Other parameters can be set through the software.

4.3 Servo Driver Parameters

Setting unavailable for laypeople. Unsuitable setting may cause fatal detect to the servo, and damage the machine or cause bodily harm to the user. If parameter setting is needed, please contact maintenance man with the G-First.

4.4 Equipment Periodical Maintenance

To keep the equipment running correctly with a long life, please operate as described below:

- Shut off the power supply of AOI and the computer if the machine won't be used in more than 2 hours.

- Clean the dust on the equipment with dust collector or dry cloth everyday half month.

Notice：Blower for dust cleaning is strictly forbidden being used here, since it easily brings dust into the machine, which clings to the ball screw and slider or lens, and may stop the machine from running correctly.

■ Lubricate the ball screw and slider and supporting parts with lube or lubricant once every 3 month, which can reduce surface friction of ball screw and slider, and keep sound lower while the machine is running, and prolong the life of ball screw and slider.

■ Clean the dust filter of the computer once every 3 months.

■ Calibrate the camera once every 3 month.

4.5 Equipment Operating Specification

■ **Set PCB position**

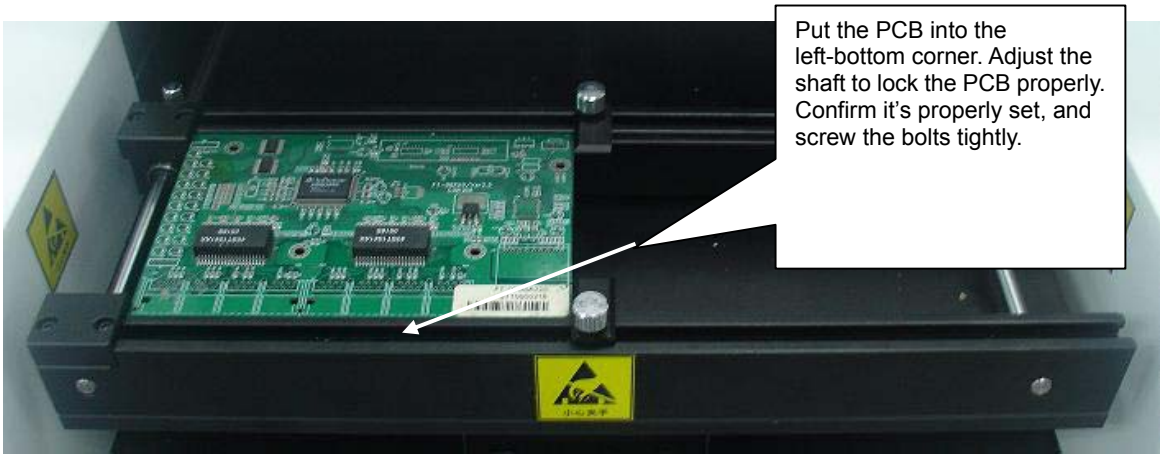
Put the PCB into the left-bottom corner. Adjust the shaft to lock the PCB properly. Confirm it's properly set, and screw the bolts tightly.

Figure 4-1

■ **Switch on power supply and restart machine**

Be sure all connecting wires are properly connected and the circuit is linked, press the **Power** pushbutton on the AOI host, and the indicator light will light and the host will start up.

Once it has been switched on, and there is a need to restart the machine, user can just switch off the power and restart it. When the machine has been restarted, press the **Reposition** pushbutton to reset the machine.

■ **Inserting and Removing the PCB**

When placing a PCB, take the middle of one side of the PCB with one hand, and with an angle of 45º, put it into the stage which was adjusted in the first step, then arrange it parallel to the stage. Avoid contact with the PCB right after inserting it. When removing the PCB, avoid contact with it immediately after successfully taking it out.

⚠ **Because the machine can self-detect PCB which is put onto the stage, and the PCB will be conveyed into the inside automatically in about 2 seconds, be sure that it won't take to long to insert or remove the PCB.**

⚠ **This product is equipped with safety curtain, which can help to keep the operator safe.**

The safety curtain covers the whole operating station, which allows operator to operate on PCB setting. After the PCB setting is finished, it will give a signal, which notices the control module to start the inspection program after a short time delay,

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and now everything is ready. If any unexpected object (e.g. hand) enters into the inspecting area, the safety curtain will give signal to the control module to stop moving parts, so that the machine is protected.

When restarting the machine, user should push the Reset button to reset the machine to the original position and restart the inspection process.

■ **Reposition**

Generally, the machine will detect the PCB on the stage. If the PCB is not automatically inserted, just push the **Reposition** pushbutton on the AOI host.

■ **Emergency Stop Button**

When meeting any emergency，please immediately push the Emergency button in the front of the AOI host. If wanting to cancel the emergency, just unscrew the button out, and push the **Reposition** pushbutton.

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Chapter 5 System Settings

5.1 Camera calibration

Camera calibration can help to test the exact resolving power and fixing angle. The camera of the host has the resolving power of 20 micron/pixel, and the fixing angle is zero. For some artificial reason, position of the camera may be changed slightly. Proper calibration can help to keep the camera capturing images correctly.
Details are below.

1) Place and clamp the PCB onto the conveyor.

2) Run the software, make a map, and double click a point in the map, the camera will be moved to that pace. As shown in Figure 5-1.

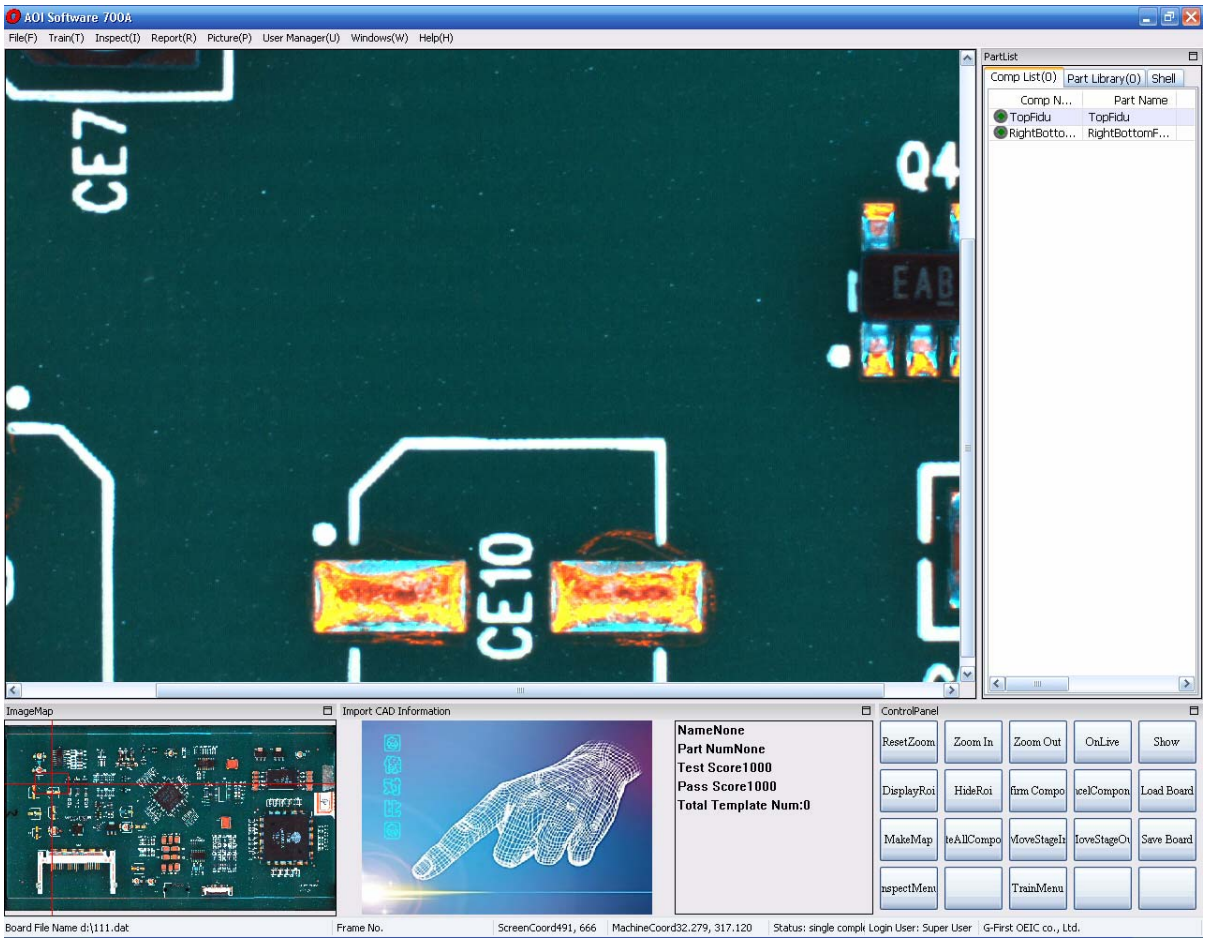

Figure 5-1

3) Click **Train** in the **Control Panel** (as shown in Figure 5-2), the page will be switched to another one (as shown in Figure 5-3).

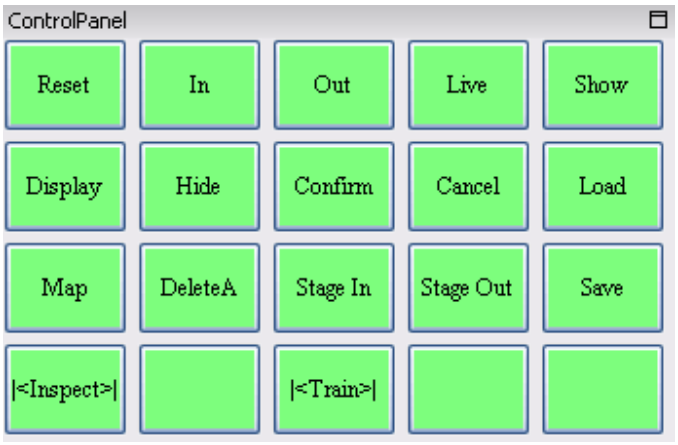

Figure 5-2

Figure 5-3

4) In this page, click **Fidu**, and a blue frame will appear, and a dialog will ask you to train the first ficucial. Choose an unique-featured area on the top-left corner of the board, and confirm it. Then train the second fiducial on the bottom-right corner in the same way.

5) Click **NewComp**, and a blue frame will appear, Choose an unique-featured area on the top-left corner of the image, and adjust the blue frame to match the area. As shown in Figure 5-4.

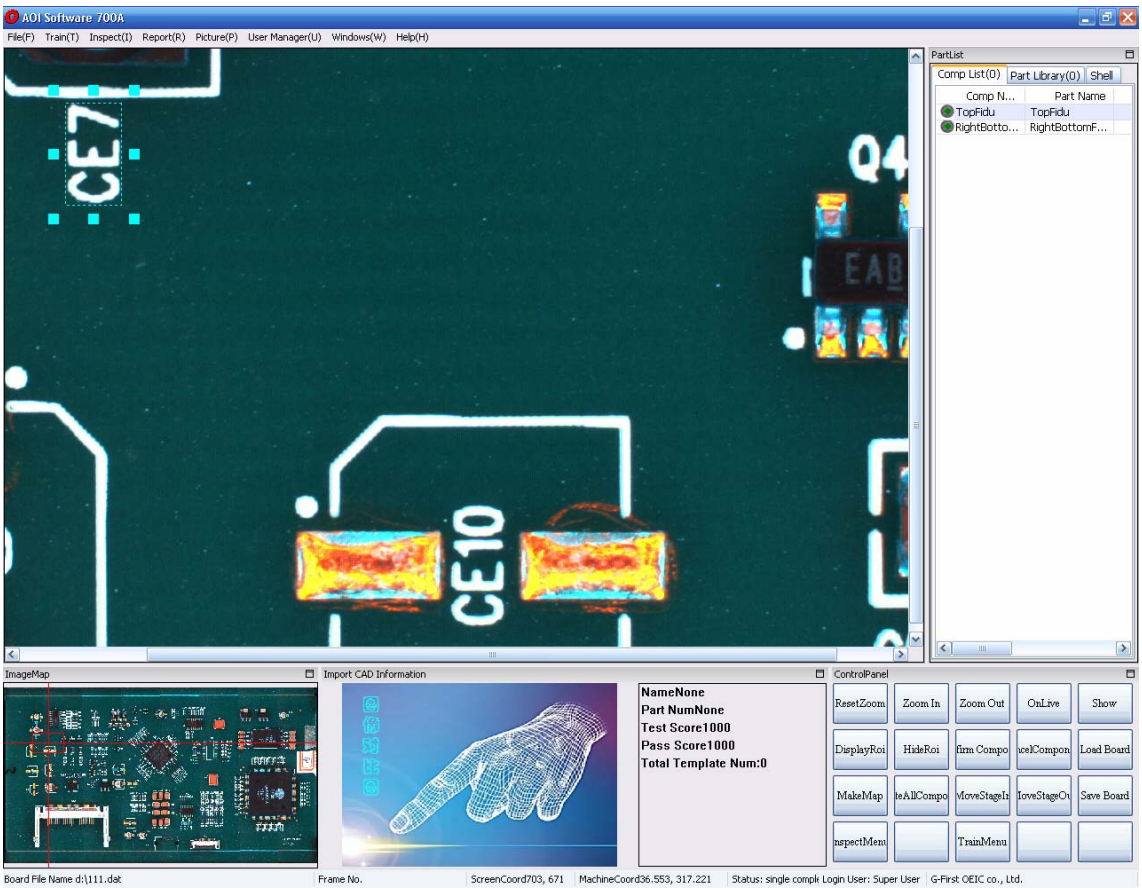

图 5-4

Press **Enter**, a dialog will pop up. Set the name of the component to **calibrator**, the threshold to 850, and uncheck the 自检焊盘. As shown in Figure 5-5.

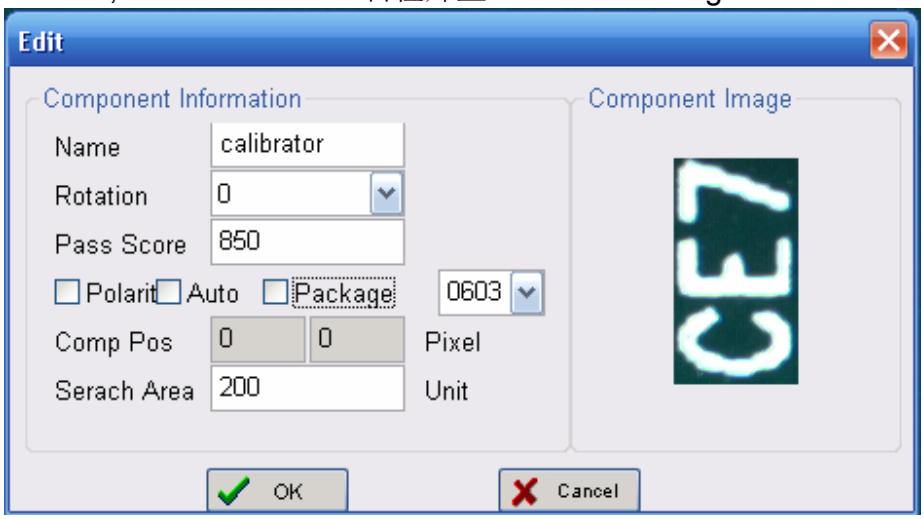

Figure 5-5

And click **Ok**.

6) Choose Calibrate in the menu Train, as shown in Figure 5-6.

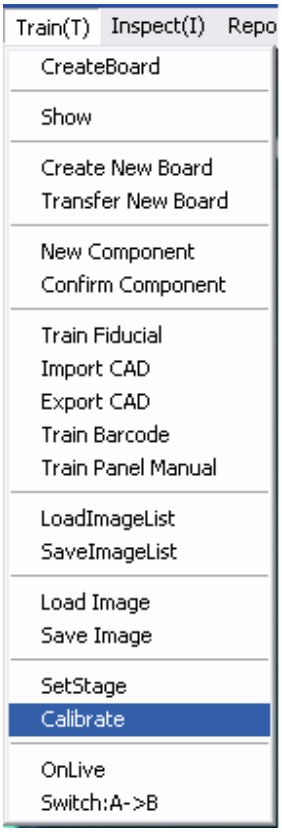

Figure 5-6

Click Ok/Yes, after a few minutes a dialog will pop up, showing the results of the calibration. As shown in Figure 5-7.

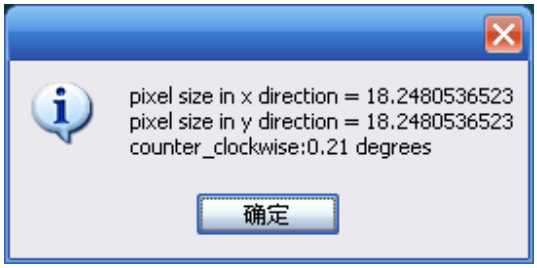

Figure 5-7

Now, the calibration is finished.

If another dialog pop up in stead of result showing dialog, as shown in Figure 5-8,you need to check if the name was set to calibrator, you need to delete the component and operate the steps above again.

Figure 5-8

5.2 Light Luminance Adjusting and Camera Color Calibration

Light luminance adjusting can uniform the light sensitivity of camera. Camera color calibration can reduce the color difference between the real objects and captured images. Proper light luminance adjusting and camera color calibration is conditioned for the machine to inspect PCB correctly and stably.

Detailed steps are below:

- Choose **Train** → **SetStage** from the menu
- Choose **Camera**, and set parameters as shown in Figure 5-9.

System settings below are commended:User can set camera parameters here, which includes Exposure, Gain, and White Balance.
After setting the parameters, click **Apply** to confirm the choices.
User can refresh the images by right clicking and dragging the image with right button down.

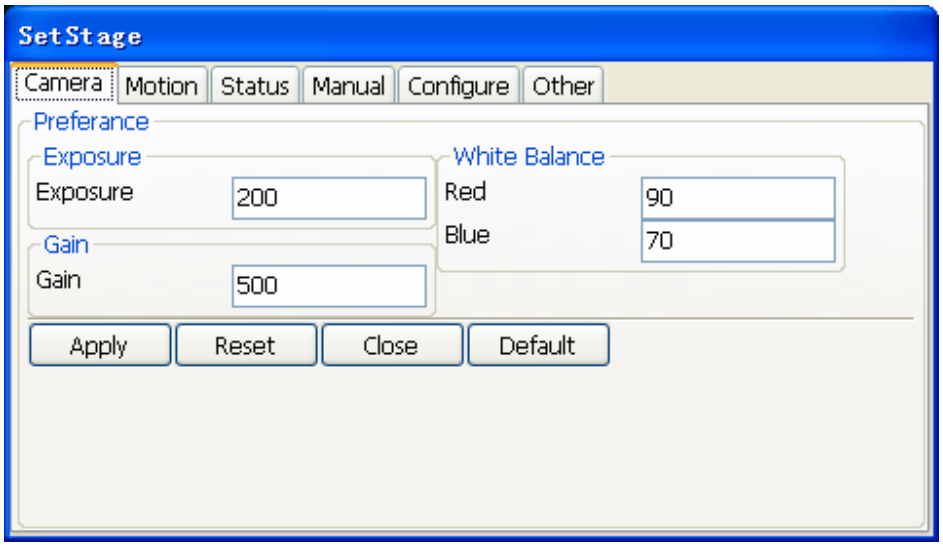

Figure 5-9

⚠ ***【Notes】*** *Handled only by professionals. Light luminance and camera color are adjusted and calibrated before leaving factory, and settings in this manual are strongly commended.*

5.3 Control

Position Restriction with Software is designed for the purpose of protecting electromotor, and is the last protection method for the electromotor after servo position limitation and movement position limitation. It can help to avoid machine damage when motor exceeding mechanical range during running.
Detailed steps are below:

Select **Train** → **SetStage** → **Motion** from the menu.

Cue: The value has direct ratio to speed of the machine.

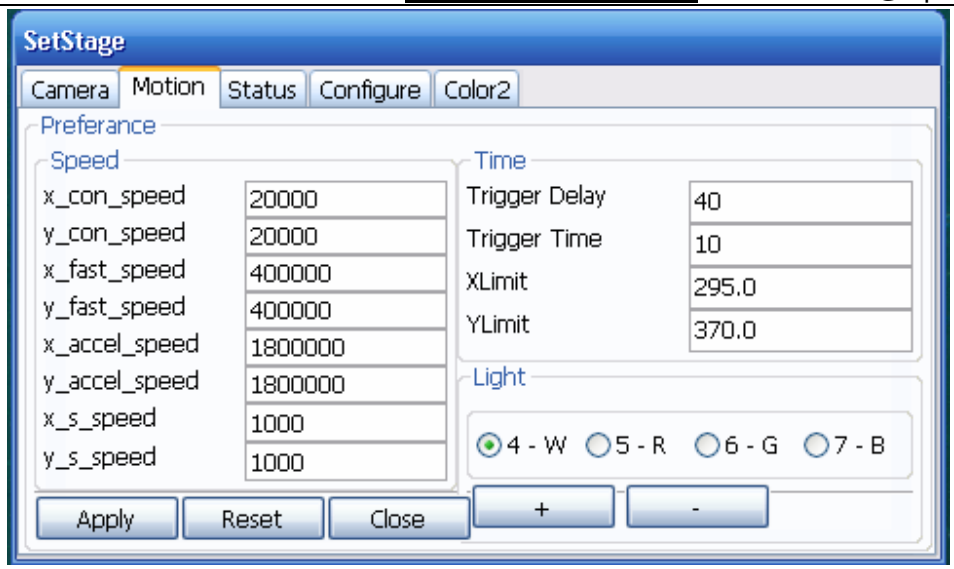

图 5-10

⚠ ***【Notes】*** *Unavailable for layman. Restriction by software is all set before leaving factory; settings in this manual are strongly commended.*

1) X_con_speed: original conveyor speed of X dimension, um/s.
Y_con_speed: original conveyor speed of Y dimension, um/s.
X_fast_speed: max conveyor speed of X dimension, um/s.
Y_fast_speed: max conveyor speed of Y dimension, um/s.
X_accel_speed：acceleration of X dimension, um/s^2.
Y_accel_speed：acceleration of Y dimension, um/s^2.
X_s_speed：S acceleration of X dimension, um/s^2.
Y_s_speed：S acceleration of X dimension, um/s^2.
2) Trigger Delay: Delay time after the light is on.
Trigger Time: Lasting time of the trigger.

⚠ ***【Notes】*** *Handled only by professionals.*

5.4 Status

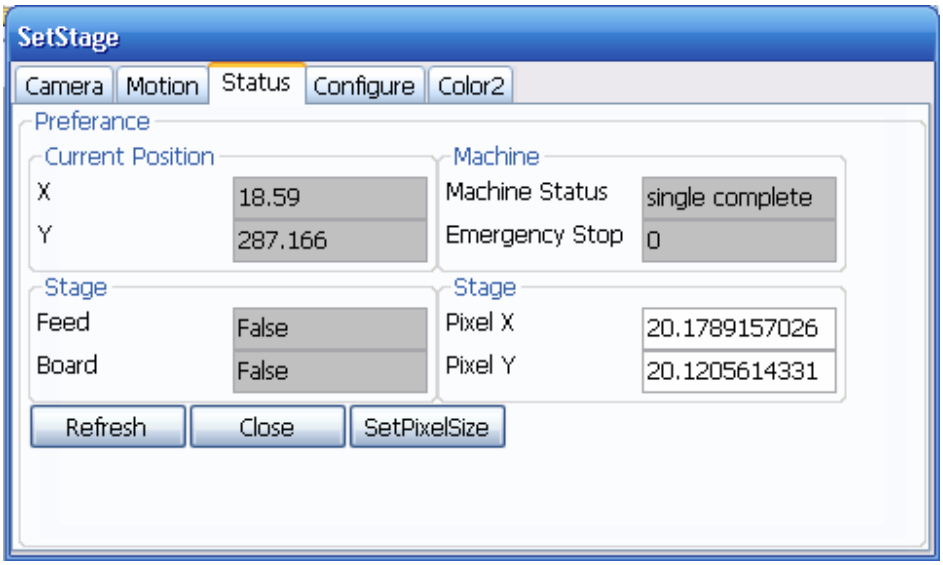

Figure 5-11

In this page, the settings usually are stable, so no need to change.
Current Psition: the poison of the conveyor.
Machine: the status of the hardware.
Stage: self-conveyed or not.。
Board: during inspection, if PCB is detected on the conveyor.
Pixel X, Pixel Y ： the result of calibration, um/pixel.

5.5 Settings

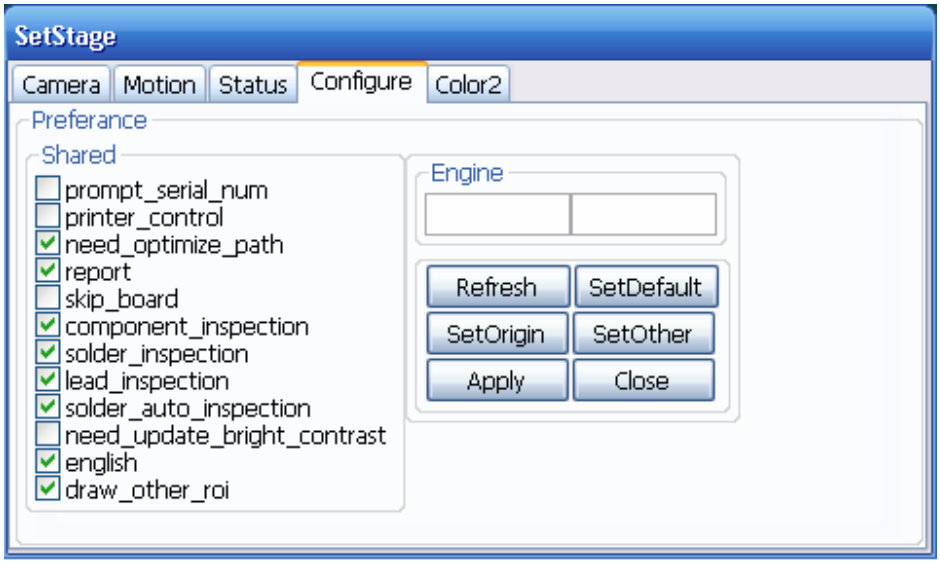

Figure 5-12

Parameters

prompt_serial_num: to input serials or not.
printer_conrol: to print data with printer or not.
need_optimize_path: to use optimized path or not.
report: to save the inspecting result to database or not.
skip_board: no inspection on a part of the paneled board, or to set the max NG number, if the result number is bigger than it, the inspection is failed.
component_inspection: to inspect components or not.
solder_inspection: to inspect solders or not.

lead_inspection: to inspect leads or not.

solder_auto_inspection: 是否检测学习为自检焊盘的器件焊盘。

need_update_bright_constract: to adjust brightness and contract of component image or not.

english: 1 English, 0 Chinese.

B Engine：Engine settings.

C Other

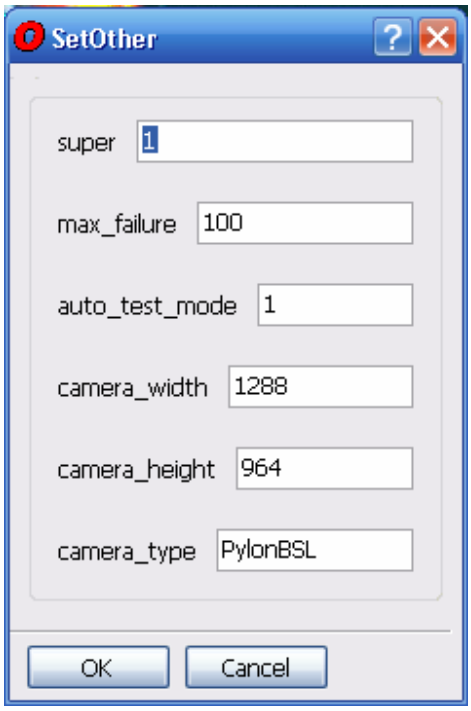

Figure 5-13

super: 1 super user, 0 no super user.

max_failure: max NG number

auto_test_mode: 1 demo mode, 0 no demo mode.

camera_width: image width, pixels.

camera_height: image height, pixels.

camera_type: Camera type.

D Origins

Figure 5-14

x_origin: Original Y value, changing according to scanning area, no need to modify, unit: mm.
y_origin: Original X value.

5.6 **Other**

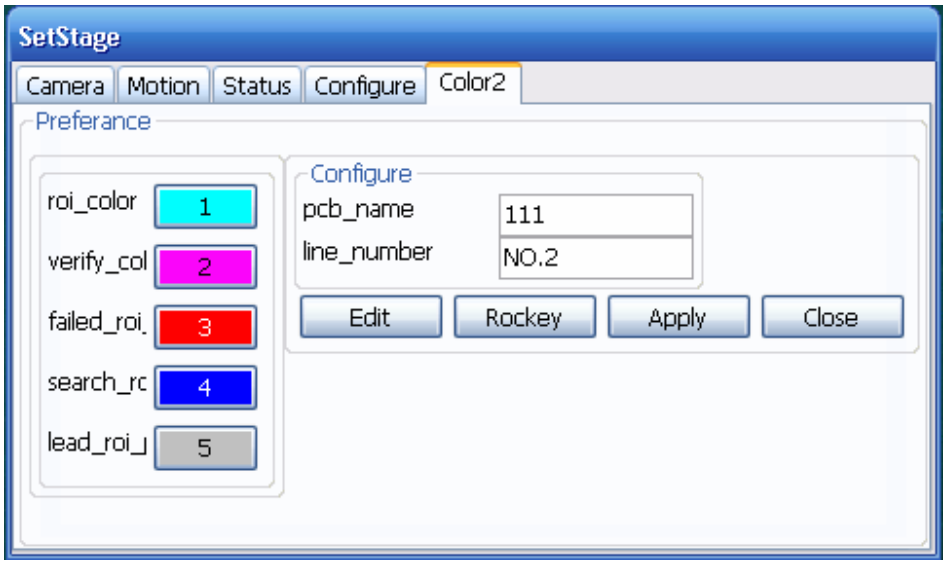

图 5-15

A Parameter settings

roi_color: color of common component frame.
verify_col: frame color of under-verified component.
failed_roi: frame color of defect component.
search_ro: frame color of searching field.
lead_roi_l: frame color of leads.

B settings

pcb_name: board name
line_number: manufacture line number

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Chapter 6 Instruction of Software Interface, Menu, & Toolbar

6.1 Running Software

Run AOI.EXE to start AOI software system.

6.2 AOI Software Interface

The software main interface is composed of **Menu**, **Toolbar**, **Image Window**, and the **Zoom-out Window**, **Component List Window** and **Status Bar**. (As Shown in Figure 6-1)

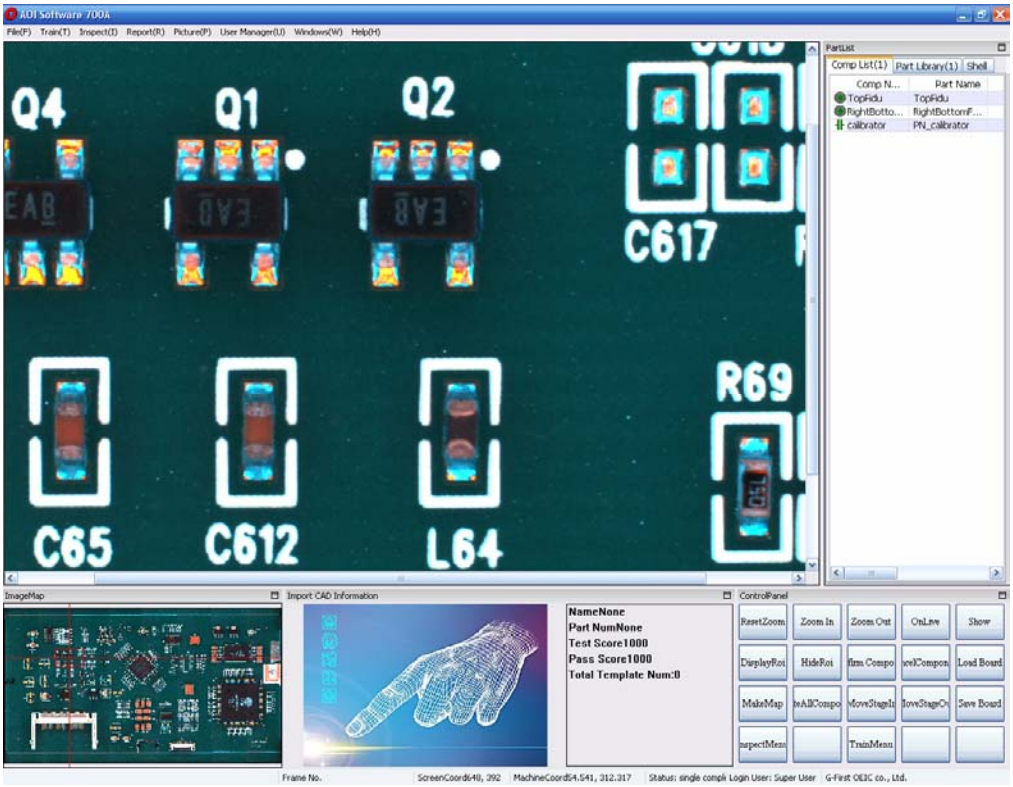


Figure 6-1 Software Main Interface

6.3 Menu and Toolbar

There are eight menus in the **Menu Bar,** including **File**, **Train**, **Inspect**, **Report**, **Picture**, **User Manager**, **Windows** and **Help**.
Under the Menu Bar is a toolbar, composed of Load, Save, Inspect, Stop, Align, Preview, Area,

Scan, Ficucial, Import, Test, New, Show, Guide, Panel, Camera, Board, Reset, In, and Out. Detailed functions and usage are below.

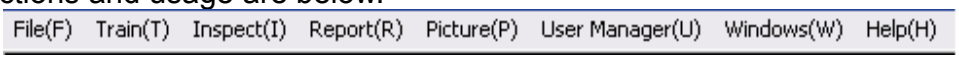


Figure 6-2

6.3.1 Menu Bar

1) File

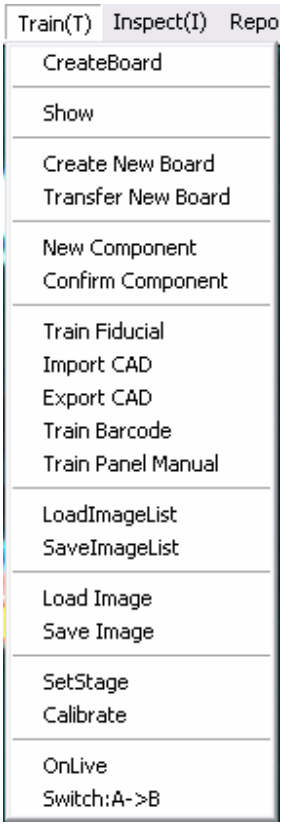
Load Board… : To open a trained PCB file for next inspection

Save Board… : To save the training finished PCB file

Save As… : To save the current trained PCB file with another name **Relogin:** To log in with another user name with different authority

Exit：To exit and close the software

2）Train



CreateBoard: To train a PCB file with a wizard

Show: There are three types of display mode, no displaying, displaying component, displaying the searching area. The default is displaying component.

Create New Board：To train a PCB file with a wizard

Transfer New Board: To convert DAT file between 2 machines

New Component：To train a new component in the current PCB image

Confirm Component：To confirm the current operation

Train Fiducial: To set 2 flags in the current PCB image as anchor point of logical coordinate

Import CAD：To import a CAD file to train a PCB file

Export CAD：To export a CAD file

Train Barcode：To train the barcode on the PCB as a component

Train Panel Manual：To train a combined PCB by training and copying a sub-board in the PCB

LoadImageList: To load a list of images

SaveImageList: To save the current image list

Load Image: To load an image from hardware

Save Image: To save the image currently captured by the camera

Set Stage：To manually adjust parameters of X and/or Y axis including Motor Parameters、Camera Parameters, status

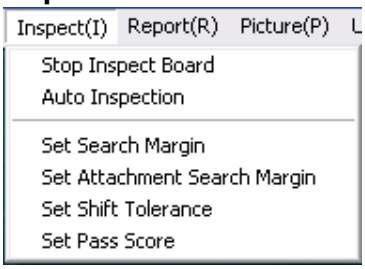
Calibrate：To calibrate the machine

OnLive： To start camera mode and capture image

OnImage：To turn off the camera mode

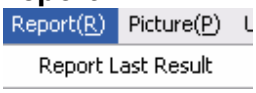
Switch:A->B：To exchange A and B side of a board

3）Inspect



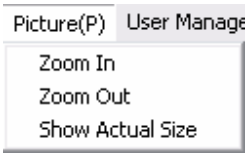
Stop Inspect Board: To stop the current self-recycling Inspection
Auto Inspection: To start the self-recycling inspection
Set Search Margin: To set the inspecting area of the component
Set Attachment Search Margin: To set the inspecting area ofe attachments
Set Shift Tolerance: To set shift tolerance
Set Pass Score：To set the lowest value for component inspection to pass

4）Report



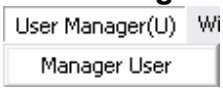
Report Last Result: To start the analyzing software for inspection result analysis

5）Picture



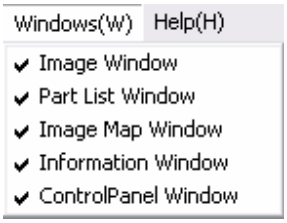
FullBoard: To resize the image to fit with window to explore
ZoomIn: To zoom in the current PCB image
ZoomOut: To zoom out the current PCB image
ShowActualSize: To display image with its actual size

6）User Manage



UserManager: To popup a edit dialog to manage users using the machine and their operating right.

7）Windows:



Click on the items can display and/or hide the relevant window.

8）Help

Help: To display the help file
CorpWeb : To visit the website of GFirst
Support : To get technical support information
About: To display brief information about Otek AOI and software version
Debug: Only used for developers.

6.3.2 Control Panel

There are mainly three pages in the Control Panel. Pages of Control Panel and tools in the pages change according to user's operations.

1）Control Page

Reset: The same with **ShowActualSize** in the **Picture** menu.
Out: The same with **ZoomOut** in the **Picture** menu.

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In: The same with **ZoomIn** in the **Picture** menu.

Show: There are three types of display mode, no displaying, displaying component, displaying the searching area. The default is displaying component.

Display: to display all components.

Hide: to hide all components.

Confirm: to confirm the last operation.

Cancel: to cancel the last operation.

Load: To load a PCB image

Map: to make a map for a board.

Live: the same to OnLive in menu Train.

DeleteA: to delete all components.

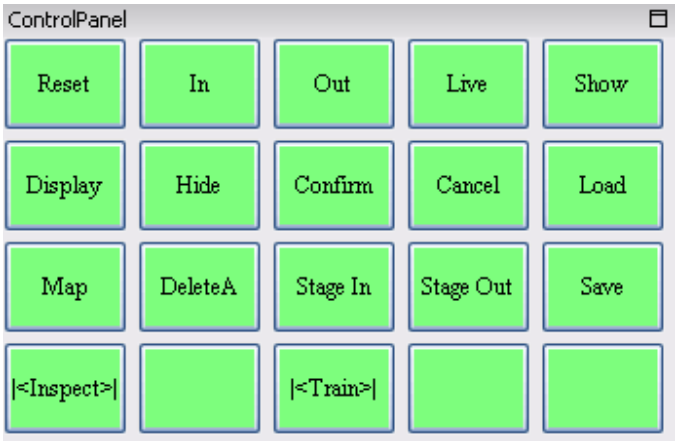

Figure 6-3

StageIn: to move the conveyor in.

StageOut: to move the conveyor out.

Save: The same with **SaveBoardProgramFile** in **File** menu.

|<Inspect>|: to switch to the Inspect page.

|<Train>|: to switch to the Train page.

2) Inspect Page

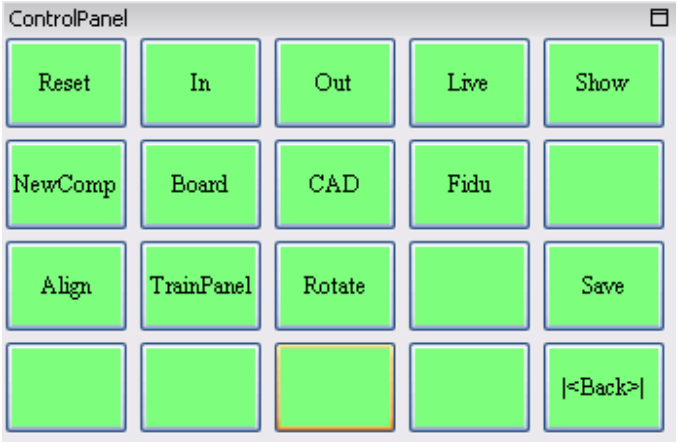

Figure 6-4

Reset: The same as **ShowActualSize** in the **Picture** menu.

Out: The same with **ZoomOut** in the **Picture** menu.

In: The same with **ZoomIn** in the **Picture** menu.

Show: There are three types of display mode, no displaying, displaying component,

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displaying the searching area. The default is displaying component.

NewComp: To create a new component.

Board: To train a board with Guide.

CAD: To import a CAD file to train a PCB file.

Fidu: To set four fiducials for the current PCB.

Align: To automatically search for fiducials.

Panel: To combine a board to a combined PCB.

Rotate: To rotate the current frame.

Save: The same as SaveAs in menu File.

|<Back>|：To switch the page back to Control page.

3) Inspect Page

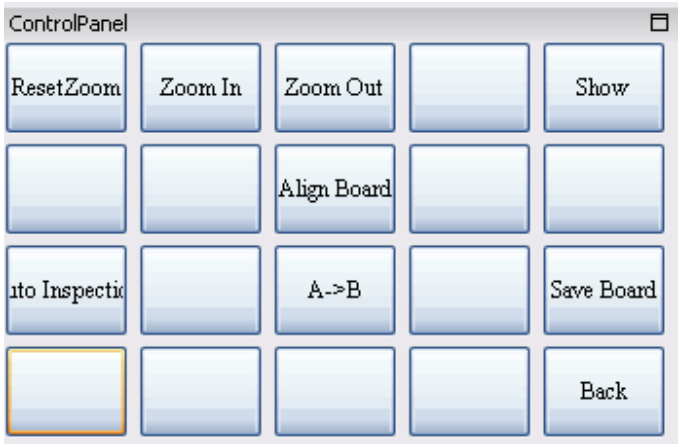

Figure 6-3

Reset: The same as **ShowActualSize** in the **Picture** menu.

Out: The same with **ZoomOut** in the **Picture** menu.

In: The same with **ZoomIn** in the **Picture** menu.

Show: There are three types of display mode, no displaying, displaying component, displaying the searching area. The default is displaying component.

Align Board: Align the PCB with fiducials.

Auto Inspect: to inspect a board.

A->B: To exchange A and B side of a board.

Save: The same as SaveAs in menu File.

|<Back>|：To switch the page back to Control page.

6.3.3 Right Mouse Button

1) If the machine is inspecting board, by right click and drag on the main image user can control to move the camera to a new place.

2) If it is under inspection, by right click the frames of component, attachment or leads, user can activate them, then tools in the Control Panel will also change.

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7

Chapter 7 Training Operation Specification

7.1 Software Start

To start the software, double click the AOI icon on the desktop or select **Start** --> **Program** --> **Otek AOI** --> **AOI**. When the AOI software is started, an **User Login** dialog will popup, as shown in Figure 7-1. Enter user name and password, and click **Ok** to confirm, or **Cancel** to quit.

7.2 Train Flow

7.2.1 Brief Introduction

When user logs on with administrator status, he can use the **Create Board** to create a PCB file according to its clue.

Click the **Guide** on the Toolbar (or select **Create Board** in **Train** menu), a wizard dialog will popup, as shown in Figure 7-2.**1**）

Step 1: Make Map

Click |<Train>| in the Control Panel, a dialog will pop up, user can create a PCB file according to its clue.

As shown in Figure 7-1.

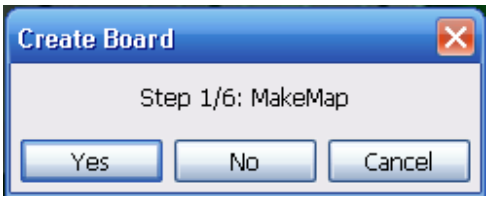

Figure 7-1

Click **Yes**.

Double click in the dialog，move the camera to the top-left of the board.

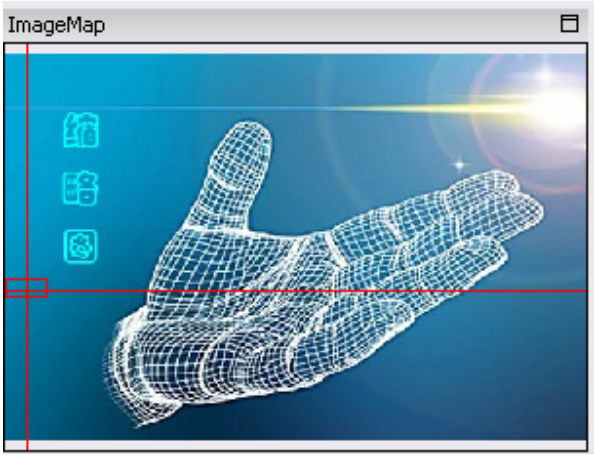

图 7-2

With the left mouse button, drag the blue frame to the top-left corner of the board and in the dialog click **Yes**.

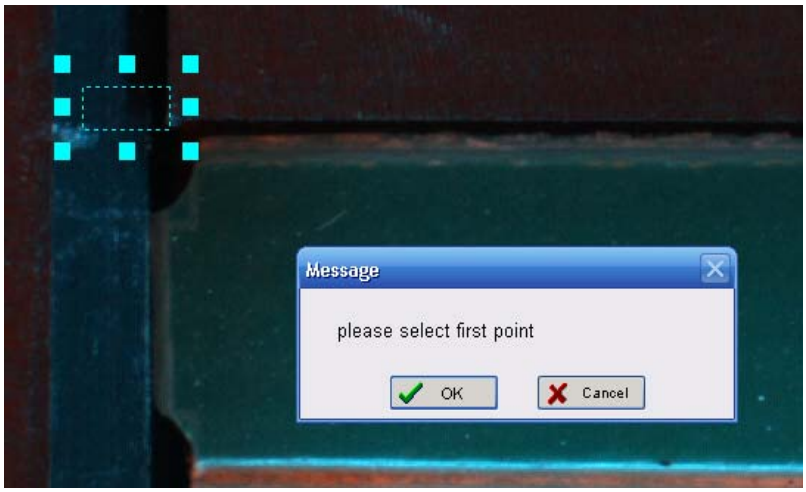

Figure7-3

Then choose the next corner the same way.
And the machine will scan the board.

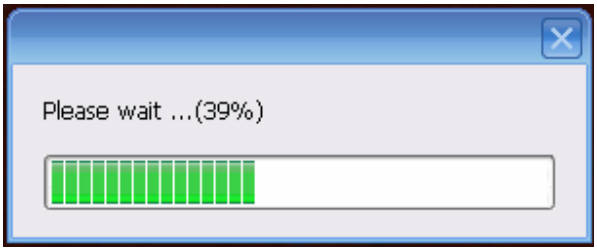

图 7-4

Step 2: Train Fiducial

After finishing capturing images, the software will ask user to set two fiducials for the PCB, as shown in Figure 7-5). Here user needs to use both the top and side light, and adjust the selecting frame to set a fiducial, click **Ok** or press **Enter** key on the keyboard, and the first anchor point will be set. Then with the same operation, another anchor points can be set.

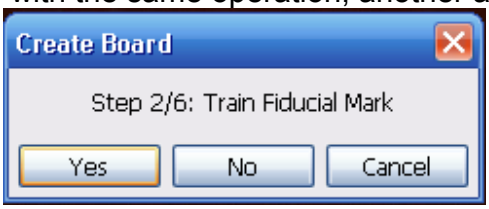

Figure 7-5

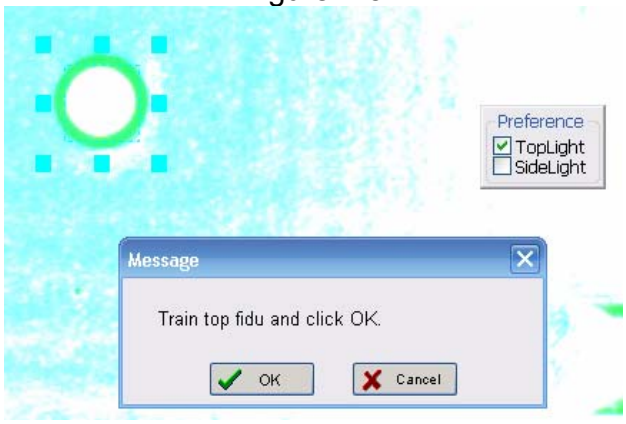

Figure 7-6

【Points】 *The fiducials are usually areas in the image with unique feature, in other words, there should be no similar image area near the selected point.(e.g. designator silk-screen)*

Step 3：Import CAD file And Training Components

After the 2 fiducials are set, the system will ask to import CAD file. (As shown in Figure7-7)
Click **Yes**.

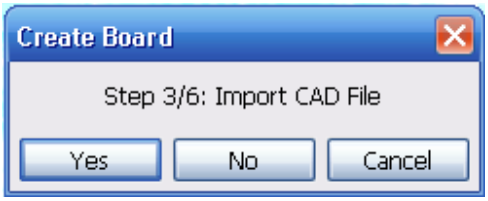

Figure7-7

Select CAD file of the current PCB, and click **Open**

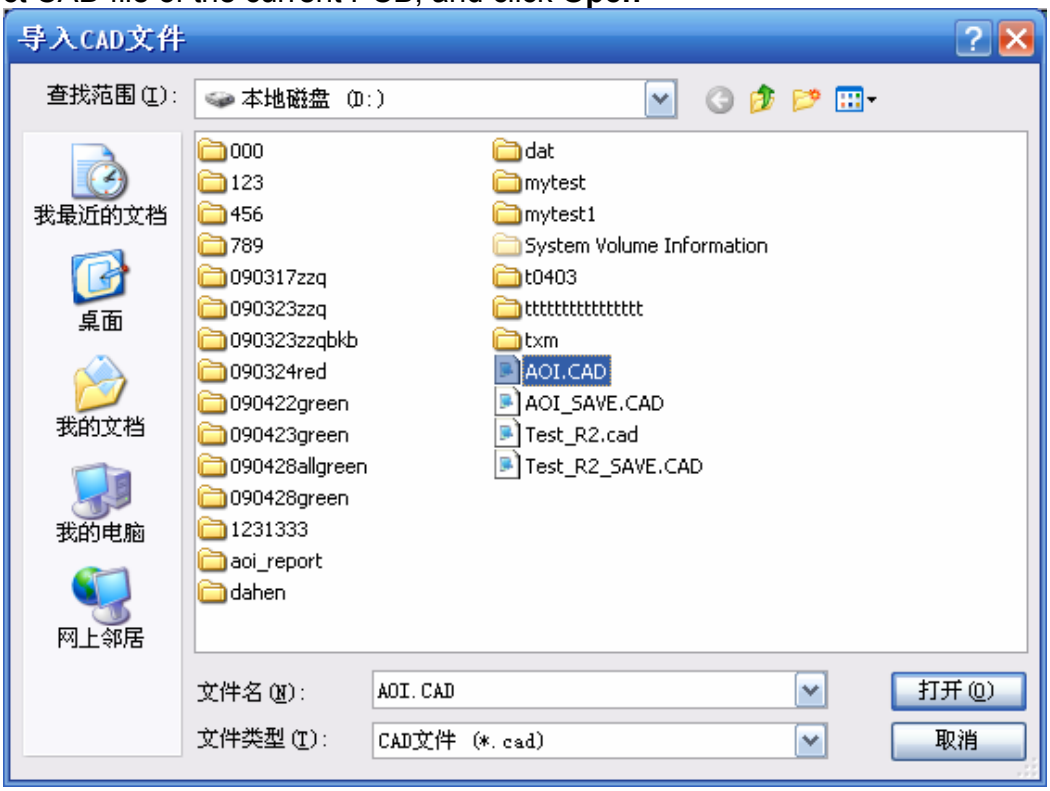

Figure 7-8

Step 4: Train 4 Components

A dialog will popup (as shown in Figure7-9) asking user to set and confirm positions of four components in the image

Figure7-9

The four components are particularly selected from the CAD file, which are at the four corners in the PCB. And in principle, the four components should have the shortest distance to the four vertexes on the PCB.

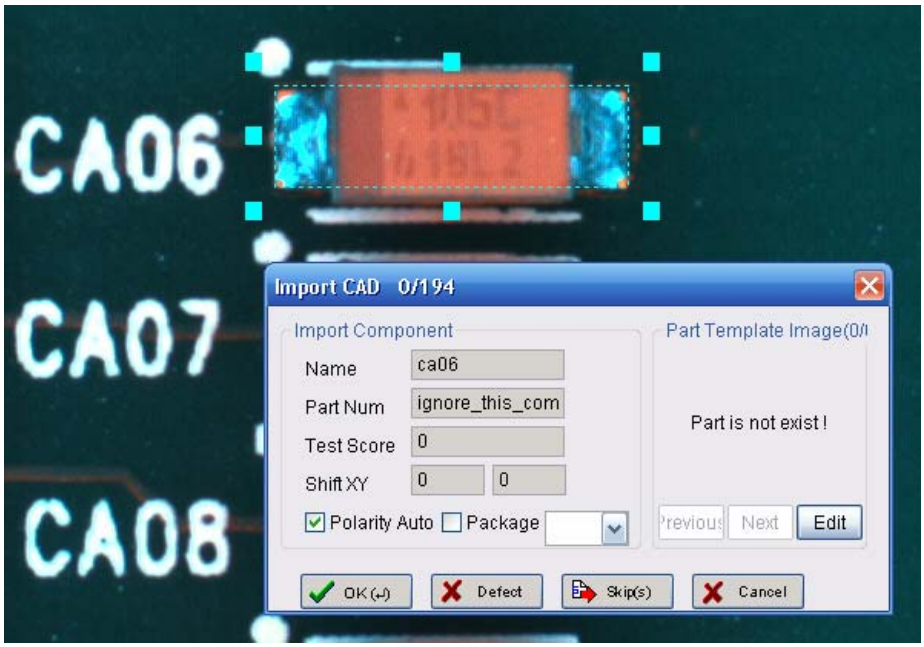

Figure 7-10

【Point】

a) Generally, components are always with a white-bordered frame of silk-screen. When positioning a component, adjust the selecting frame to fit the white-bordered frame, and the component will be positioned correctly.

*b) The four components should not be too big, if the component automatically given by system can not fit the request, just click **Skip**, and the system will automatically select another part nearby and wait for user to confirm.*

*c) When adjusting the size of the selecting frame, please take the image in the **Actual Image Window** as reference at the right-top corner.*

After the two steps above, system should begin to guide user to train components on the PCB according to the order in the CAD file.

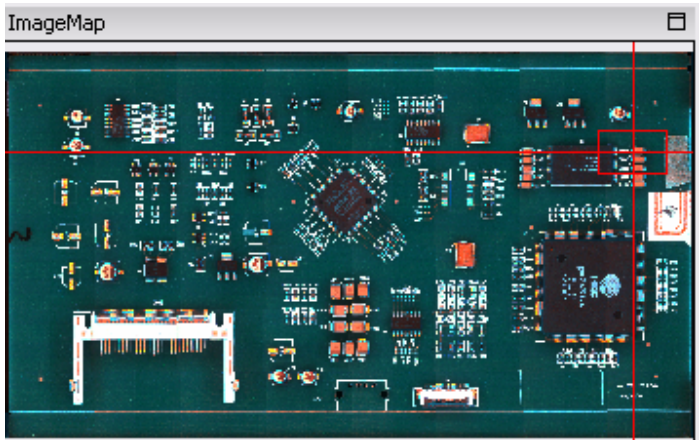

Figure 7-11

Step 5: Train Components

After the two steps above, system should begin to guide user to train components on the PCB according to the order in the CAD file. As shown in Figure 7-12.

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Figure 7-12

A green-bordered frame will automatically appear, surrounding the current component to train. Adjust the size of the frame using mouse or keyboard and click **Ok/Yes** in the dialog or just press **Enter** key on the keyboard to finish current component training.

As shown in Figure 7-13

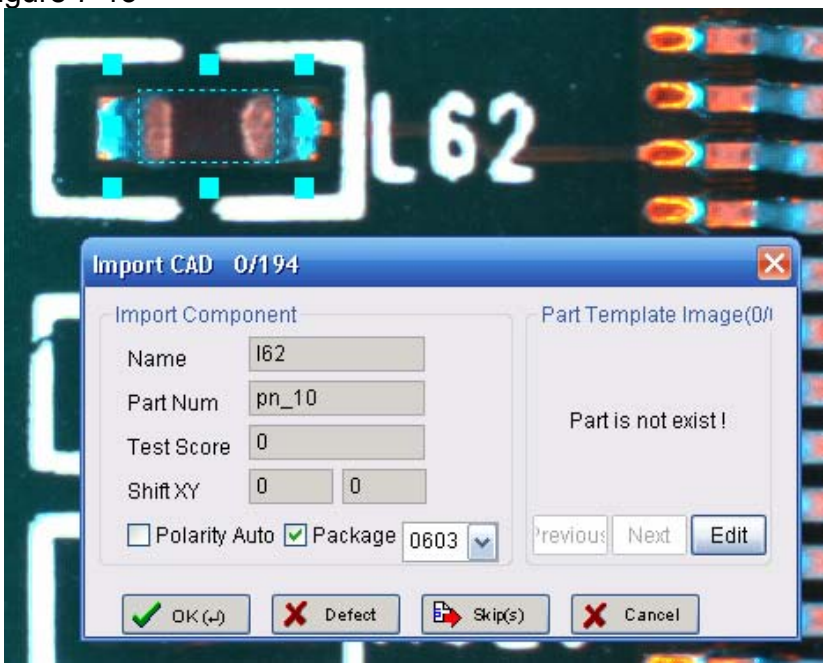

Figure 7-13

If the current component is incorrect and not fit to be made a template, just click **Wrong**，and the next time the same component is encountered during inspection, system will inform user to choose whether to re-train it. Wrong component is marked with red frame.

If user come across components that don't need to be inspected or should not have existed, just click **Skip** to ignore the current component. (But for those missed components user should click **Wrong** or use shortcut key **Ctrl + D**)

User can click **Cancel** to cancel importing current CAD file.

【Point】

1) This software has self-training capability, when finishing training a component, the software will automatically train other homotype components on the current PCB. If self-training cannot achieve previously set conditions, the software will mark the component with a pink frame (As shown in Figure 7-14), and suggest user to adjust the selecting frame manually to achieve the best conditions.

2) If the component is color-correlated, user can choose Auto checkbox, and select Color; if it is characters, select Char.

3) If the component has polarity, check the Polarity checkbox.

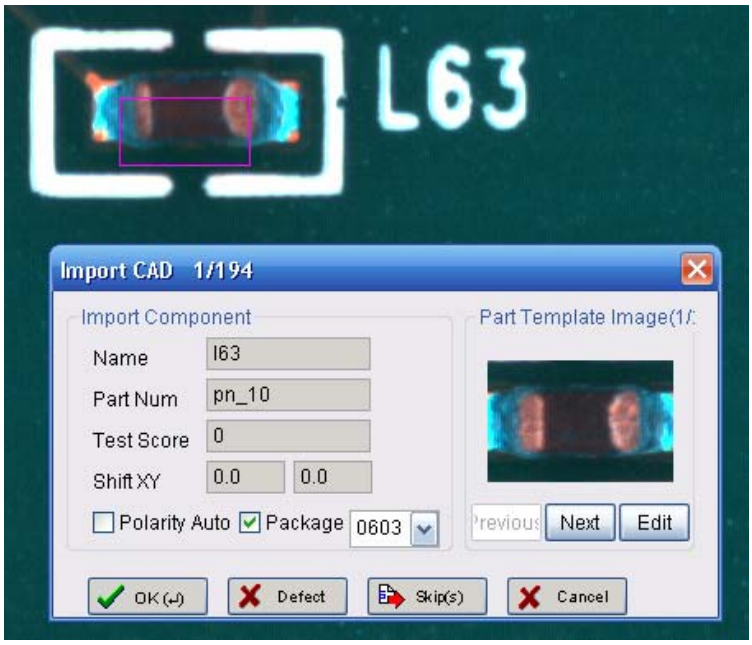

Figure 7-14

After all components the same type are trained, system will inform user to train the next component according to the order in the CAD file. Follow operation described above to train other homotype components on the PCB.

After finishing all trainings, system will popup an information dialog showing information of imported components. (As shown in Figure 7-15)

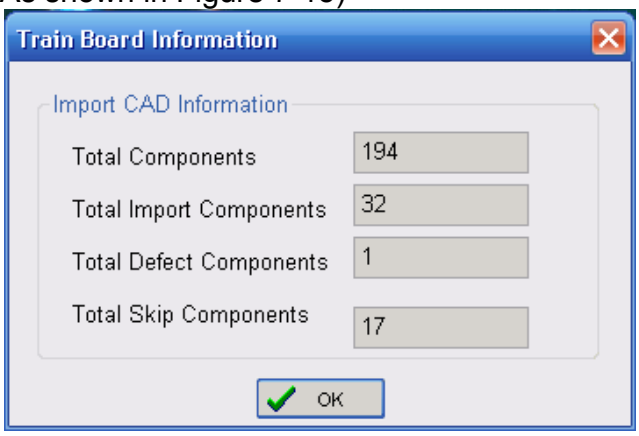

Figure 7-15

Step 6: Train attachment

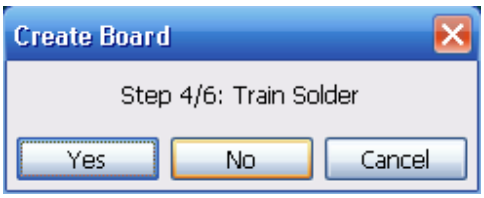

Figure 7-16

Click **Yes**.

Green-bordered frame will appear and surround attachments of the component to train. (As shown in Figure 7-17) Use mouse or direction keys to move the frame to proper position, adjust the size of the frame with mouse or **Ctrl + Direction**. The **Right** and **Left** keys can be used to adjust the width of the frame, and **Up** and **Down** keys, the height. After finishing

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operation above, click **Train** to finish training the attachment and go to the next, and if user thinks there is something wrong with the attachment, just click **Detect**, and system will inform to retrain it during next PCB inspection. If the default orientation of attachment by the system is incorrect, click **Rotate** to readjust it.

Figure 7-17

Cue:

1) It is better to have shadow of solder included in the frame, this can lead to a better training effect.

2) If attachment automatic training is enabled when user creating CAD file with CAD Generator, software will automatically finish training attachment(s) of the component when training the component. If not, software will inform user to train attachment(s). (Attachments of IC are not included here.)

3) To achieve a better inspecting effect in training attachment, selected area should include bright and dark parts of the attachment(s).

4) To achieve a better inspection effect in training IC attachments, the selected area should be longer than the length of the attachments, and it is better to set 1/2 of the distance between attachments longer as shown in Figure 7-18.

5) For those components with big size, you need to divide them into several ICs to train, after training components according to CAD data.

After finishing training attachments on one side, system will draw a new green broken-line bordered frame symmetrical on another side of the component. With the same principle, adjust the position with mouse or direction keys, then click **Train** to finish training the attachment**.** Click **Complete** to finish training attachments.

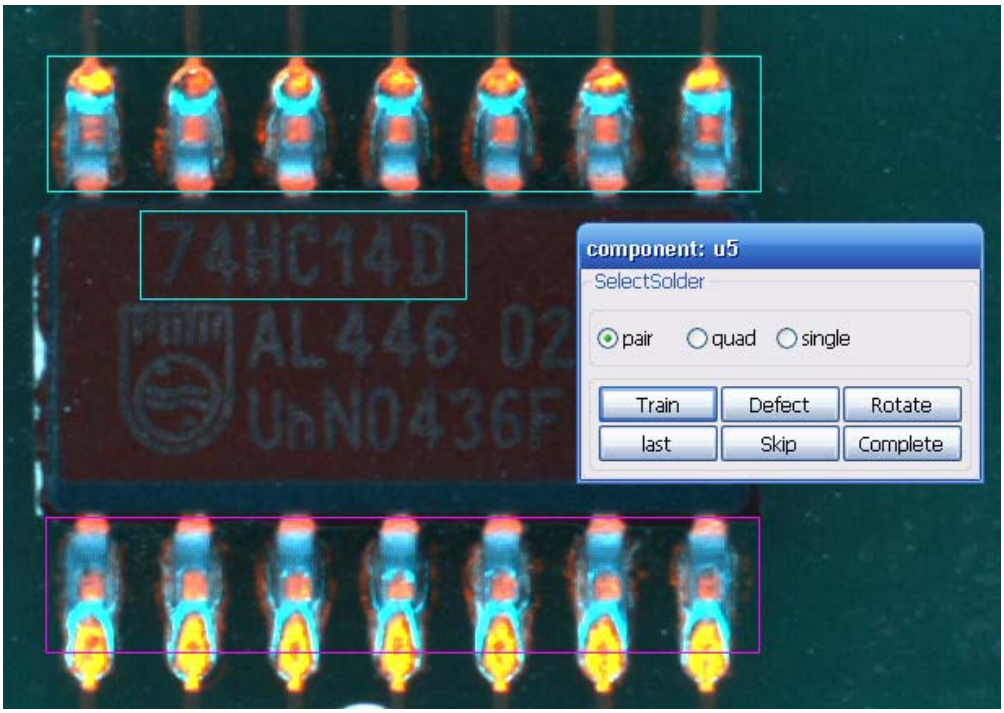

Figure 7-18

The software has the capability of self-training, after finishing training attachment(s), it will automatically train its attachments when meeting homotype component next time. But if the self-training can not achieve conditions which are set before, the software will mark the component with a pink frame and user should adjust the selecting frame manually to achieve the best condition(s).

If some component attachment is not well trained, user can click **Back** to retrain the attachment.

Keep doing the steps above，till finishing training all component attachments.

Step 7: Train Lead(s) of IC

A dialog will pop up during IC leads training to facilitate user to confirm training IC leads.

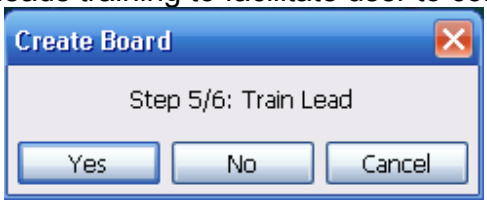

Figure 7-19

Click **Yes**, system will automatically calculate IC leads, and draw a green-bordered frame surrounding each lead. User can adjust and/or modify spaces between leads, position and account of attachments, spaces between attachment, by clicking "**+**" and/or "-", as shown in Figure 7-21, where "++" and "--" are for adjusting bigger extent.

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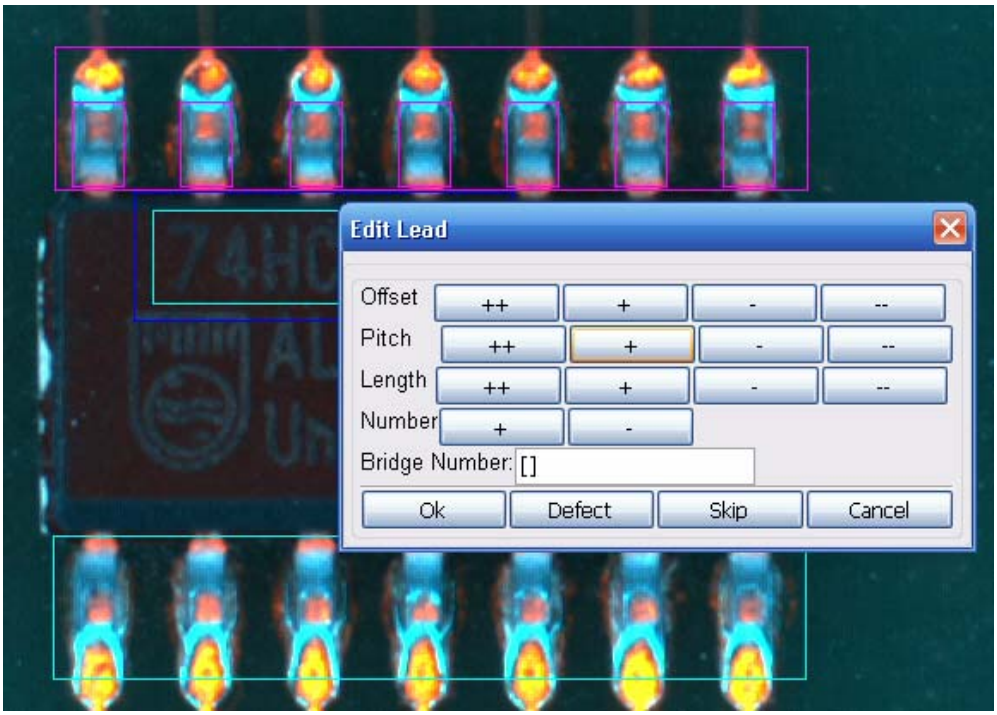

Figure 7-20

【Point】

a) After training leads on one side of IC, leads on another side will be trained automatically.
b) It's better for the frame of lead to cover and be a little longer than lead of IC.

Step 8：Train barcode

If there is barcode on the PCB to train, click the **Yes** to confirm, otherwise, **No** to ignore it. After clicking **Yes**, a green-bordered frame will appear. Drag the fame to the barcode (This can also be achieved by double clicking the barcode in the barcode area.) and adjust its size to fit the barcode till it covers area of the bar properly. (See in Figure 7-21) System will automatically identify the barcode and get information from it during inspection.

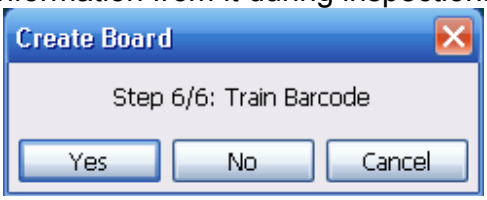

Figure 7-21

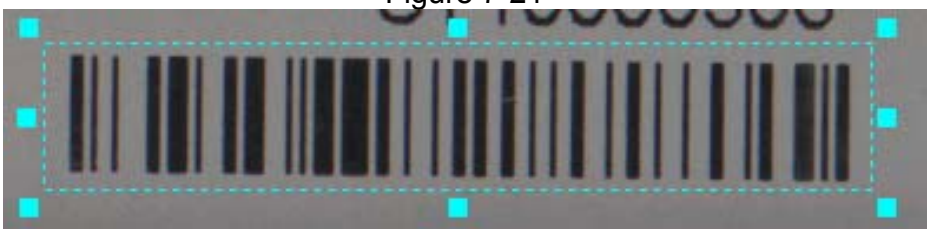

Figure 7-22

【Notes】 *For those pasted manually, position of them will have difference, and it is better to set a large searching area.*

After training the barcode, a dialog will pop up. Click **Ok** or press **Enter** on keyboard, and an information dialog will appear, shown as below.

Figure 7-23

Step 9：Save the finished PCB file

After training a PCB, user can save the result so that it can be used when needed later.

Figure 7-24

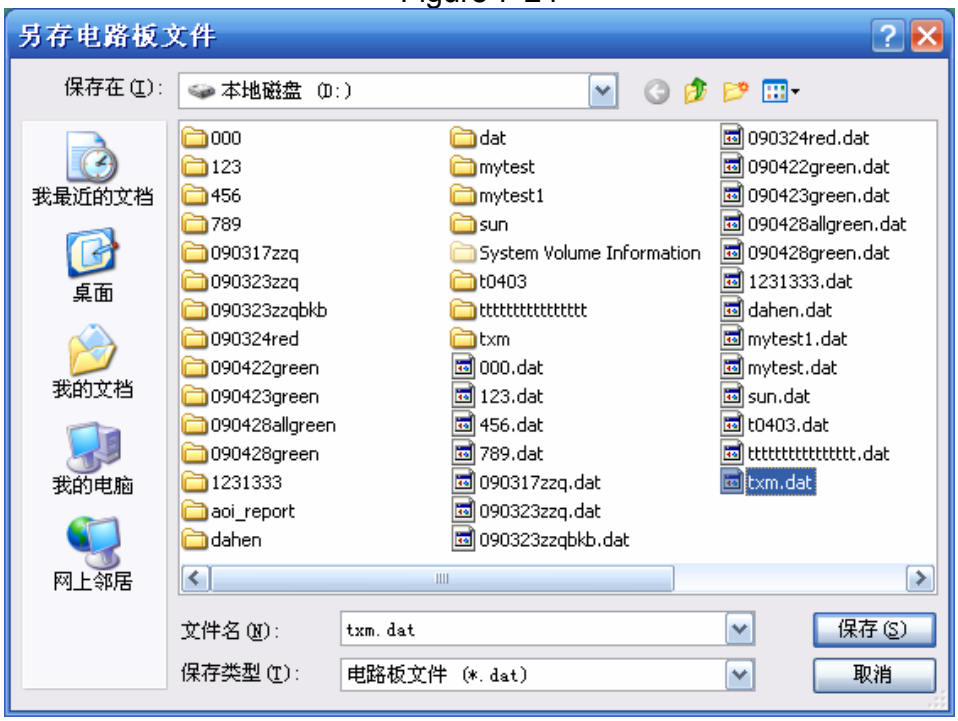

Figure 7-25

Saving information dialog:

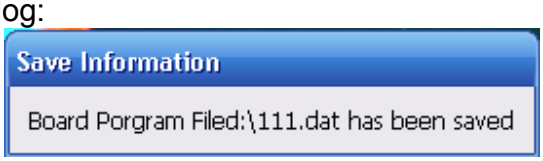

Figure 7-26

7.2.2 Paneling Operation

If a PCB is composed of some small PCBs which are designed the same on the same PCB, training operation can be simplified by training one small area instead of the whole PCB, and operation of training is the same as described above but the components to be aligned should

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be components near the four corners on the whole PCB.

Step 1: Start

Switch the Control Panel to Train page.

Step 2: Select Positioning Component

In the main image frame, choose a component by right click inside the frame

Step 3: Rotate

Click **Panel**, a dialog will pop up, asking to position the board. As shown in Figure 7-28.

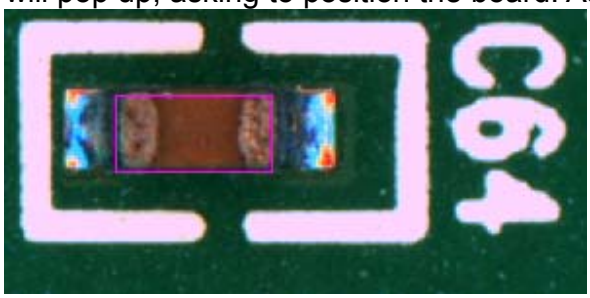

Figure 7-27

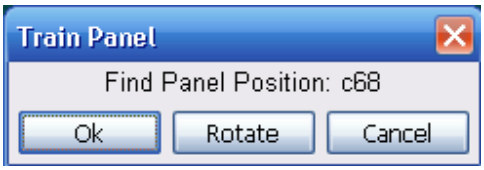

Figure 7-28

If some angle needs to be changed, then click **Rotate** and the outline of the frames will rotate. Each time user clicks Rotate, 90º will be changed.

After rotating the frames, user can cancel by clicking Cancel. If the frame needs to be rotated more times, **DO NOT** click **Yes/OK**.

Step 4: Position

Find the corresponded component in other area in the map, by double clicking in the map. And adjust the frame carefully to match the component.

After adjusting the frame, click **Ok/Yes** in the dialog to confirm, or **Cancel** to cancel the paneling operation.

Step 5: Complete

Now OTEK S350 will starting taking pictures of the new area of the board.

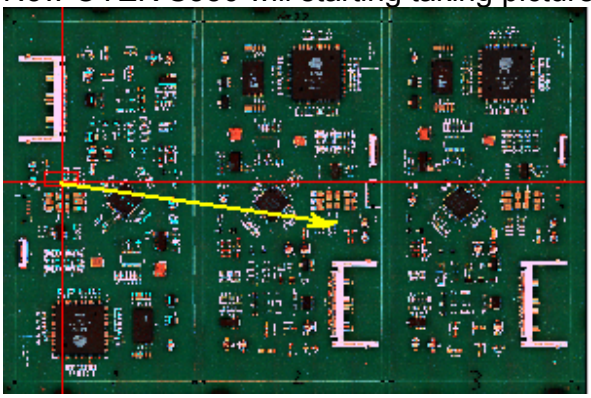

Figure 7-28

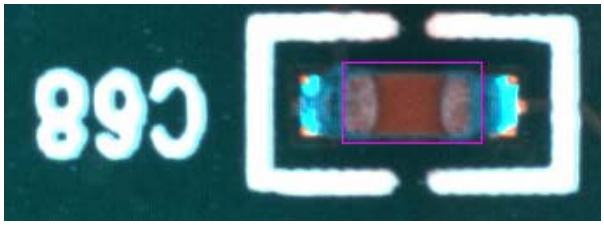

Figure 7-28

Cue:

In paneling operation, it is the best to choose a component in the middle of the image.

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7.4 Later Modification

After the intellectualized auto-training by system, user also needs to adjust and correct the PCB file which is automatically trained and built, to make the *.dat file lead to better inspecting effect.

1) Adjust part/component

To train a component not included in the CAD file, click **NewComp** in the Control Panel. A frame will appear, adjust the frame to match the size of the component, and then press the **Enter** key on the keyboard.

2)**Adjust attachment(s)**

To train an attachment, right click on the component, and click EditAttachment, then adjust the size and position.

3) **Adjust IC Lead(s)**

Right click on the attachment whose leads needs to be corrected, and clicEditLeads.

4) Reedit parameters of the component(s)

Right click the component and click EditTemplate,a dialog will pop up, as shown in Figure 7-29.

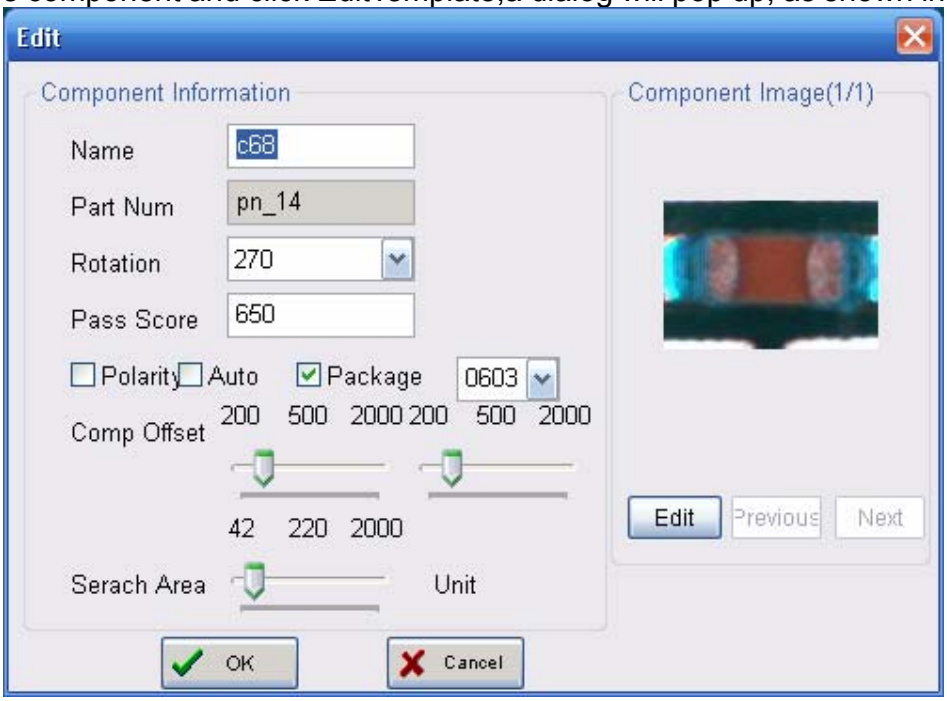

图 7-29

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8

Chapter 8 Inspection Operation

8.1 Inspecting Flow Chart

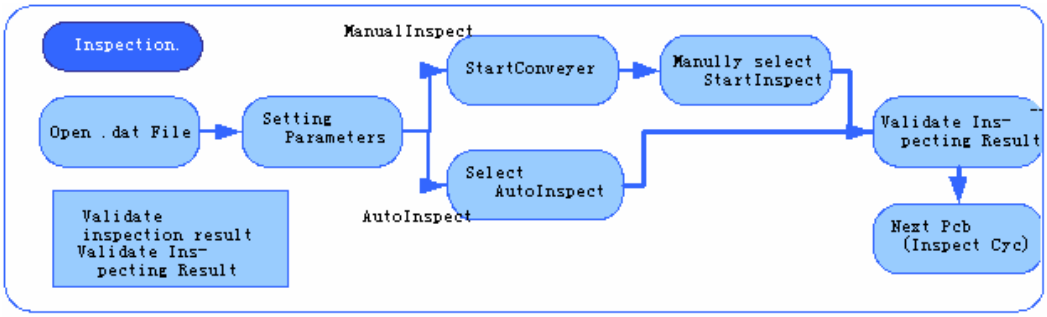

Figure 8-1

The software provides two inspecting patterns, one is auto-inspection, and another is manual inspection.

8.2 Inspecting Operation

8.2.1 Auto-inspection

■ **Open .dat File**

Select **Load Board Program** in the **File** menu, or just click **Open** on the Toolbar，and a dialog will pop up and ask user to choose a (.dat) file, as shown in Figure 8-2. Select the file, which was trained earlier and click **Open**, and the software will load the file.

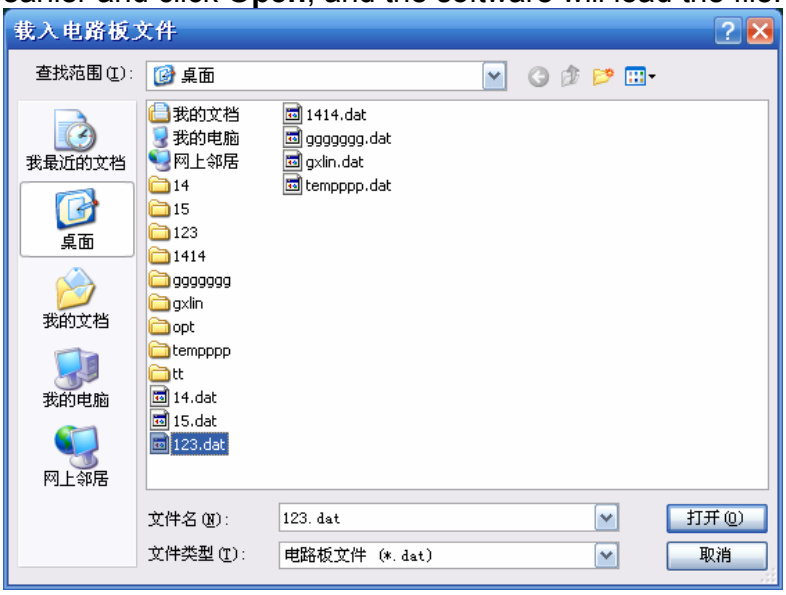

Figure 8-2

Setting Parameters

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After opening a standard PCB file, user can set some parameters if it's needed, or just use the default settings. Select **Set Search Margin** in the **Inspect** menu, as shown in Figure 8-3. Set search margin, and another dialog will come out. Enter a value, and click **Ok** to finish setting search margin.
Then select **Set Pass Score** in the **Inspect** menu, and set the pass score in the dialog, as shown in Figure 8-4. Click **Ok**, and finish setting pass score.
Generally, if user doesn't change the setting(s), the default value(s) are used

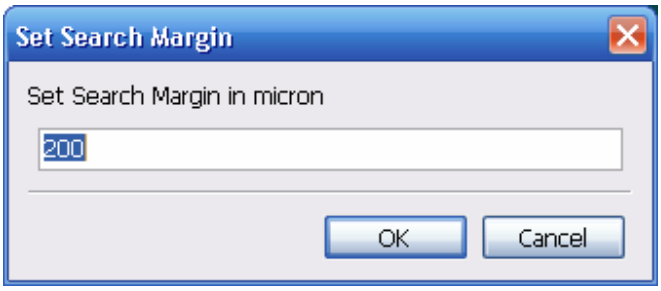

Figure 8-3

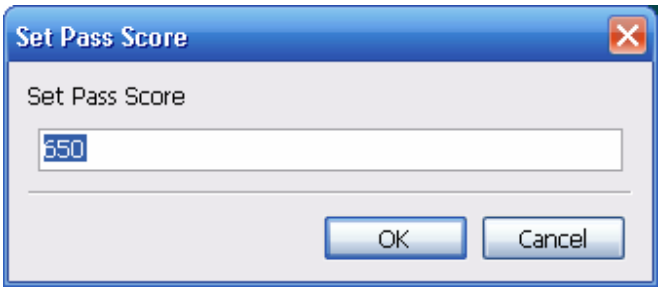

Figure 8-4

Cue: *The higher the pass score is, the higher inspecting delicacy is, and accordingly ,the higher false-detect ratio of the inspection result. Contrarily, false-detect ratio will be lower.*

1) Start Inspecting

After a standard PCB file is opened, click **AutoInspection** in the **Inspect** menu, or just click **Inspect** in the Control Panel, and auto-inspection will start. What user will do is just to fix the PCB to inspect onto the conveyor.

2) Validate the inspection result

After a PCB is inspected, a dialog will pop up to let user validate whether there is any component that didn't pass during the inspection. As shown in Figure 8-5.

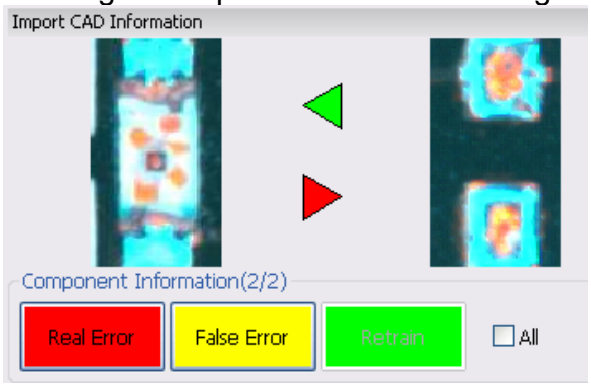

Figure 8-5

If it is not a wrong component, there are two methods to deal with it. If nothing needs to be

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done, just click **False Detect**. If users need to retrain the component, then click **Retrain**, and system will train a new component template image, and add it into template library, unless there are 15 templates in it already.

If there is something wrong with the component, then click Real Detect, and choose the detect type in a popup dialog. Key 1，2，3，4，5，6，A，B，C，D are shortcut key of detect type of 1，2，3，4，5，6，A，B，C，D. The detect styles include Shift, Bridge, Missing, Too much Solder, Wrong Polarity, Insufficient Solder and Wrong part.

Users can add more detect types in the failure_type.ini file.

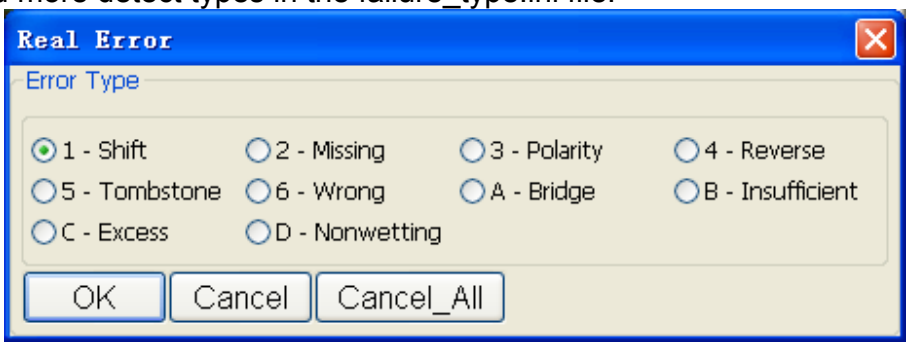

Figure 8-6

Shift
means the position of the component is wrong.

Bridge
means some leads of the component(s) are unexpected connected with solder.

Missing
means a component is missed in the current position.

Too much Solder
means too much tin is for the component in the current position.

Wrong Polarity
means the polarity of the component in the current position is wrong.

Insufficient Solder
means solder on the lead is not enough.

Wrong part
means the component in the current position is a wrong one.

Cue:

a) When the machine is inspecting the first PCB, it can capture images of the second PCB, thus the inspecting speed is increased.

b) During paneling inspection, if the current sub-PCB is useless, system will automatically skip to ignore it.

3) **Stop inspection**

To stop the inspection, click **Stop Inspect Board** in the **Inspect** menu.

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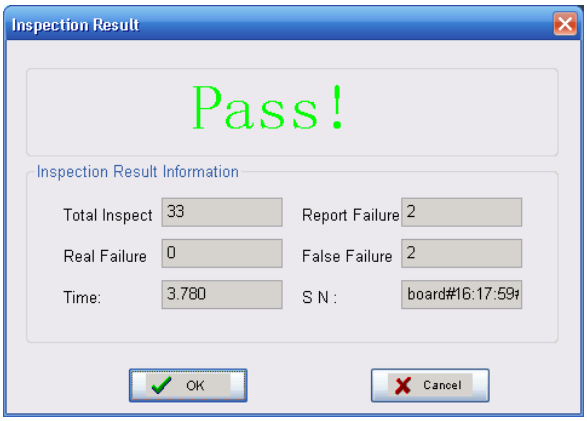

Figure8-7

Figure 8-8

9

Chapter 9 Inspection Reports

Inspection report is for later equipment examination and repair after inspection, all detailed information recorded during inspection can be found here, and for those PCBs with barcode, user can explore all detect-type and position information by scanning the serial number on the barcode with a barcode-scanner. All detailed records can be printed, and statistic information is also provided, for example, the amount and percentage of each detect type appearing in a period of time.
Click **Inspecting Report** in the menu, and start the inspection report program.

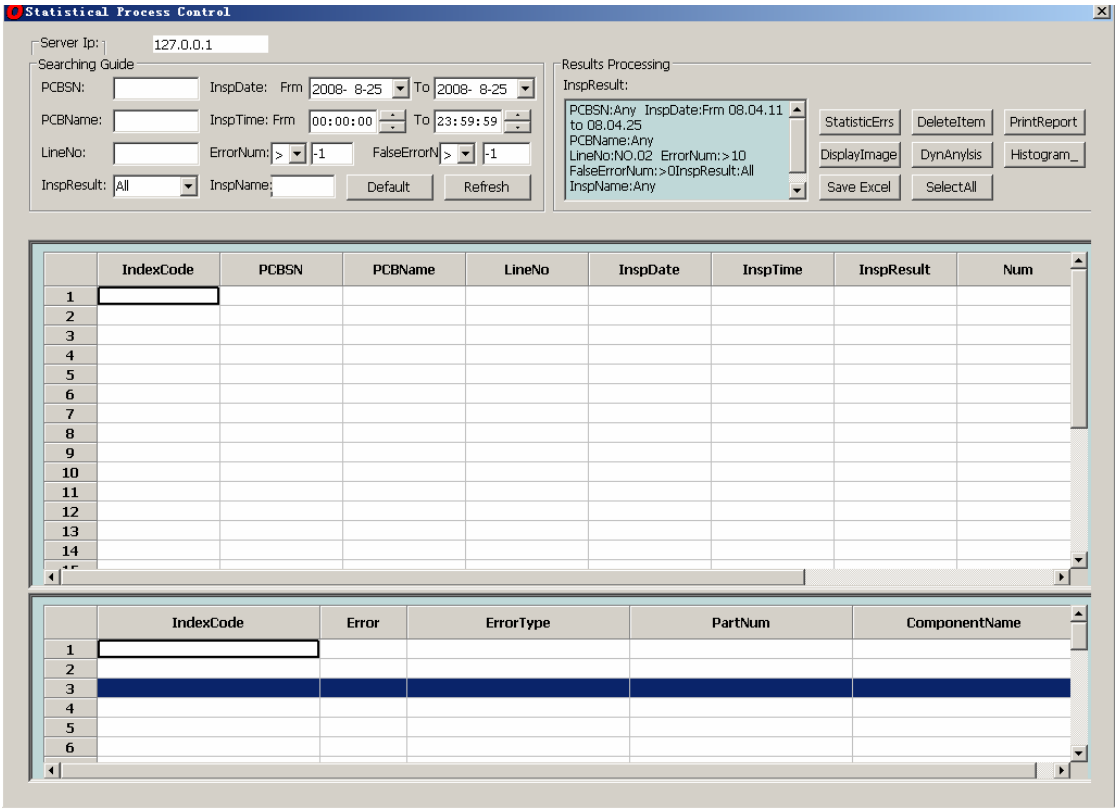

Figure 9-1

SPC module is included in Otek AOI Software, data got in inspection can be saved into it in real-time. With help of these data user can find and solve problems during manufacture, and control product quality.

The main interface is shown in Figure 9-1.

The SPC module mainly has functions as described below.

■ **Auto-save and display**.

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Data created in inspection is saved into database in real-time, and can be displayed.

■ **Data statistic and inspection trend analysis**

System can create pie and bar charts according to data statistic, and statistical curve can tell the changing trend of the detect types.

■ **Exporting Excel formatted file**
User can export Excel formatted file, which can be opened, explored and processed with MS Office.
■ **Image display**
User can explore the inspected PCB images, and positions and resets of each detected component. User can also check the detailed image of the detected components.
■ **Network**
User can check the inspecting result with a PC by connecting the AOI computer through intranet. With this function, user can fix the detected components on the PCBs.
■ **Barcode Reading**
User can read barcodes with a barcode reader, and SPC will show the detecting information and images to user.
■ **Print reports**.

9.1 Network Connection

Figure 9-2

Start the AOI computer and enter IP of the server (IP of the AOI computer). If the IP is not set, then the default server will be the local computer.

9.2 Search Records

Enter key words into widget in the Searching Guide (as shown in Figure 9-3), and click **Refresh**, and data fit with the researching condition will be searched and listed out in the upper part of the data displaying area.
Click **Default** button, and the key word in the widgets will be set to default values by the software.

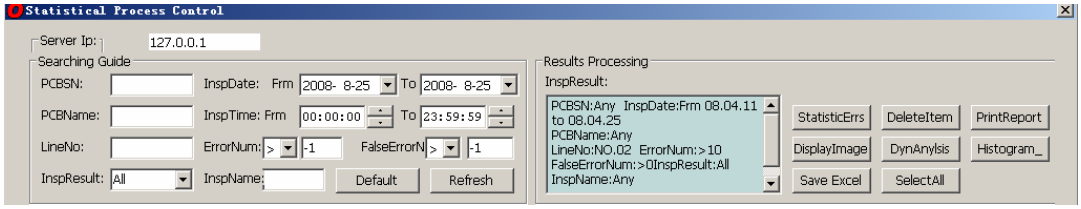


Figure 9-3

9.3 Data Display

Open SPC database module, and click **Refresh** button on the main interface and all data saved in the database will be displayed as shown in Figure 9-4.

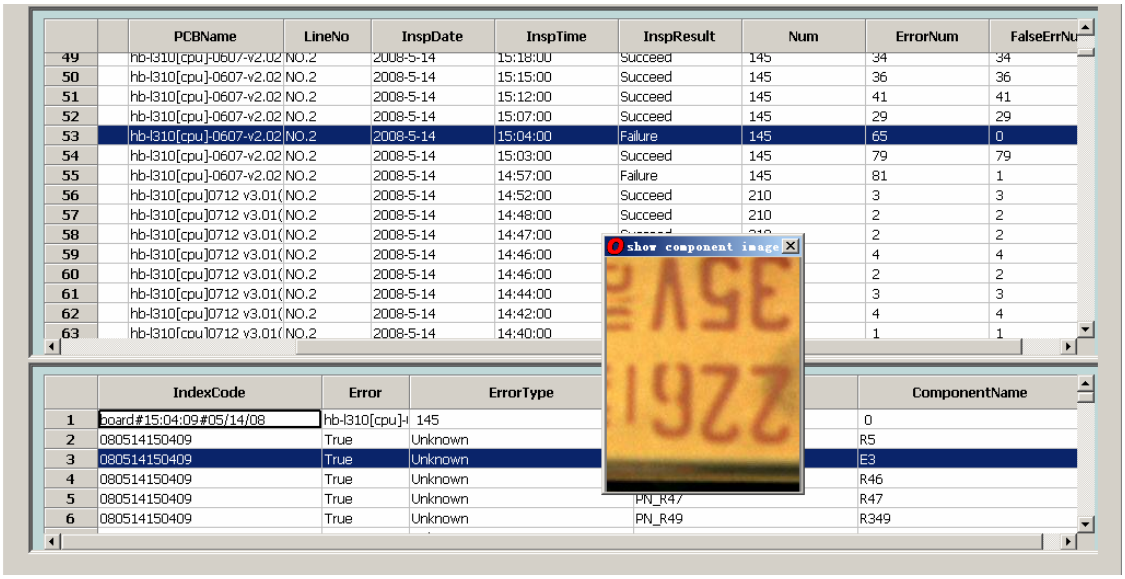


Figure 9-4

The data displaying area is split into two parts, the upper part displays the inspecting result records, which includes information of index code, PCB serial number, PCB name, line number, inspecting time, inspecting result, path of image saved, number of inspected components, detect number, false detect number, code of inspector, inspector name, and whether printed or not. The lower part displays detailed results of one of the records, which includes information of detect type、component name、X and Y coordinate，and width and height.
Left click a detect record in the lower part, and the detailed image will be shown.

9.4 Statistics and Analysis

Click on the record(s) to select record(s) in the grid, and click **StatisticErrs** button in the Result Processing in the main interface, and a dialog will be opened displaying detailed detect information.

By clicking **SaveExcel** , user can save the result as MS Excel formatted files.

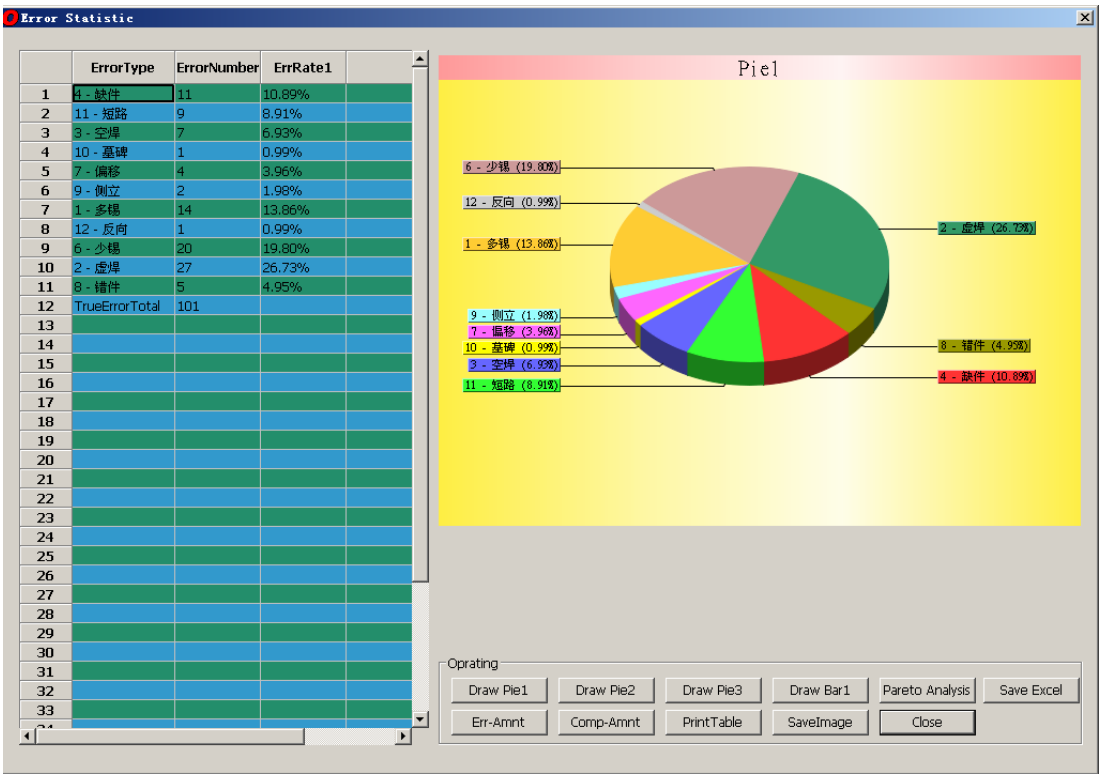


Figure 9-5

Click **Err-Amnt** button and the statistical grid will show numbers of all detects in the selected record(s), and click **DrawPie1** button, a pie chart will appear which shows percentages of all the detects.
The software provides five types of charts for data statistic here, as shown in Figure 9-6.

Click **Cmpnt-Amnt** button and the statistical grid will show numbers of all components in the selected record(s), and similarly, software can display the percentages of all the components in detect.
If user needs the current chart, just click **SaveImage** button to name and save it.

Click **Close** to quit and close the dialog.

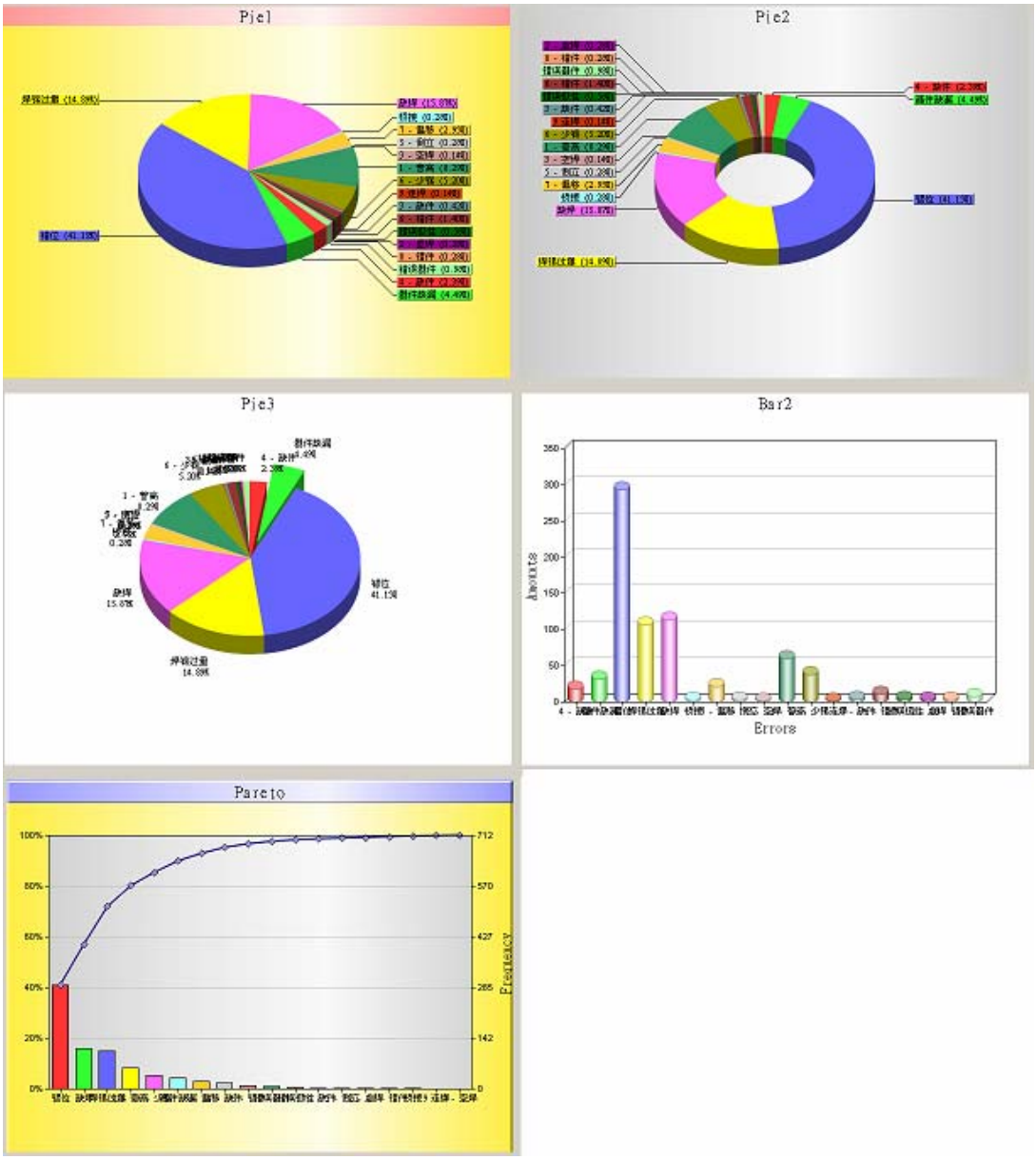


Figure 9-6

9.4 Histogram

Select records in the main frame, and click **Histogram** button, then a dialog will pop up, select the type of detects and click Refresh, the histogram will appear. As shown in Figure9-7.

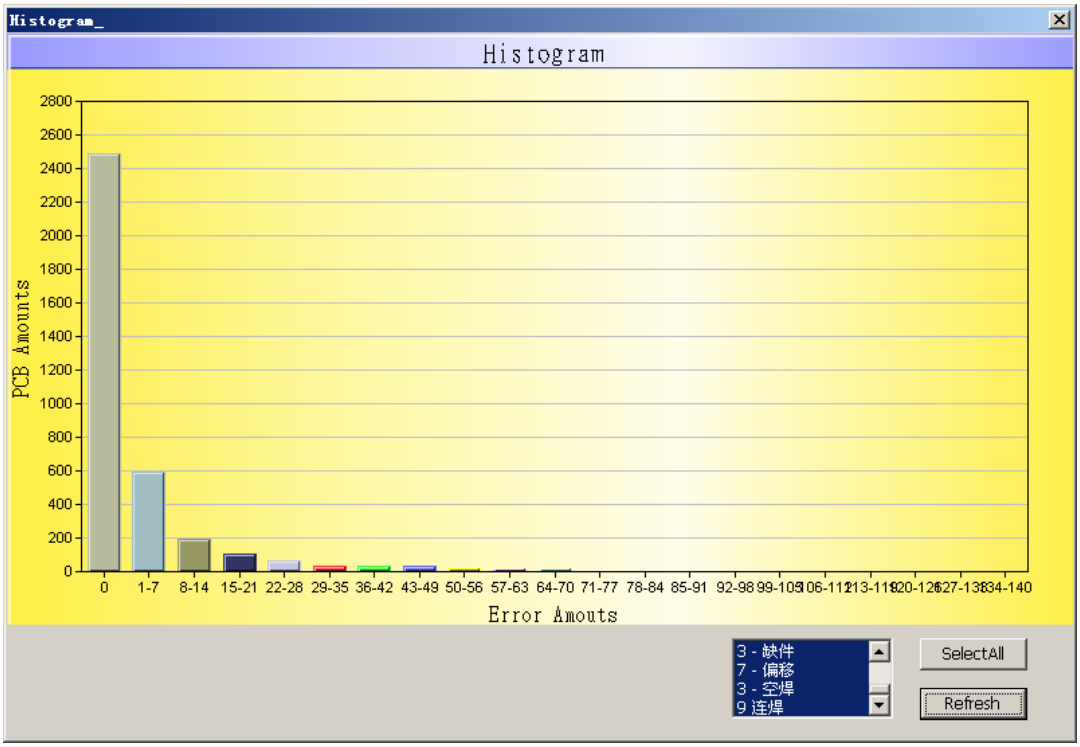


Figure 9-7

9.5 Inspection Trend Analysis

Click button **DynamicDisp** in the main frame, and a dialog will appear, as shown in Figure 9-8), allowing user to set parameters including **DateFrom**, **DataTo**, **TimeFrom**, **TimeTo**, and **TimeStep**. TimeStep means interval between two steps.

Two modes are provided. Users can choose Mode1 to analyze data according to time, and Mode2 to analyze according to the inspection progress.

Set the dates and times properly, and click Refresh, system will calculate and analysis the data, and draw all trendlines out which shows the trend of all detects as time going.

If only some particular lines are needed, just choose the detect type(s) in the **LineToDraw** box and click DrawItem, and the software will draw and display the chosen lines in the X-Y Bar.

User can choose PCB name for the under-analyzed PCB, then perform analysis.

Click to quit and close the dialog.

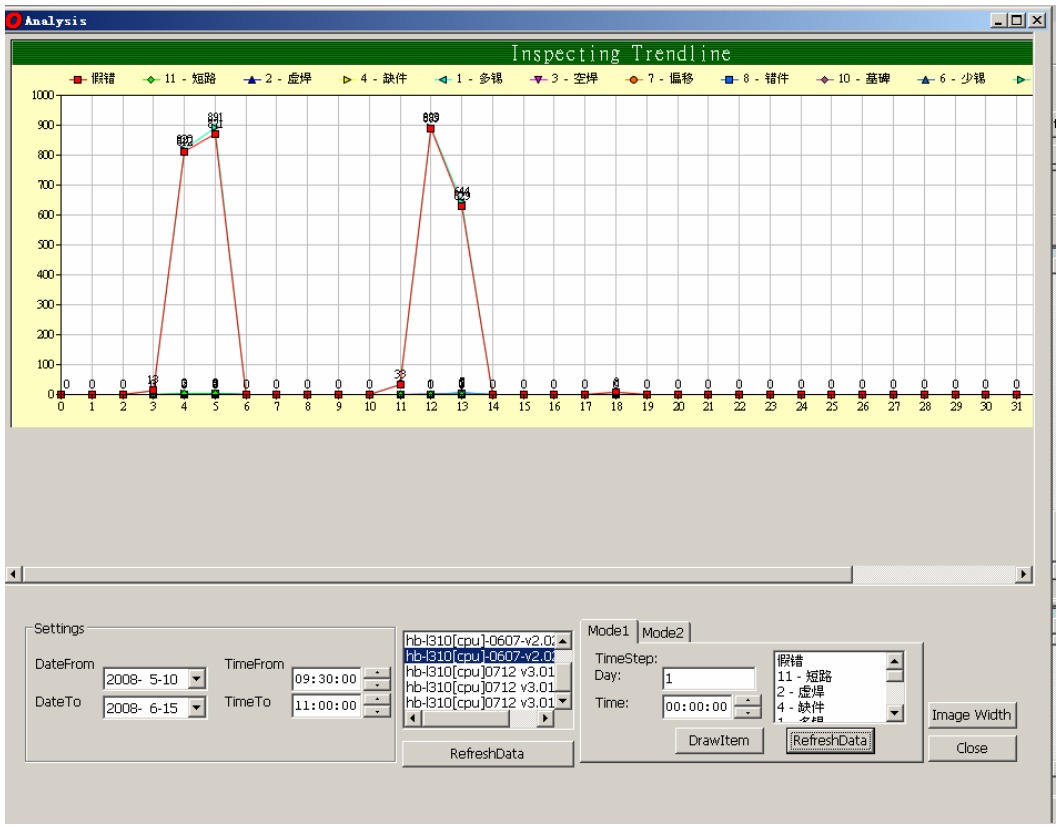


Figure 9-8

9.6 Image Display

Select one record in the inspection result list, and click **DisplayImage**, a dialog will pop up , showing the full image of the PCB.
Shown in Figure 9-9.

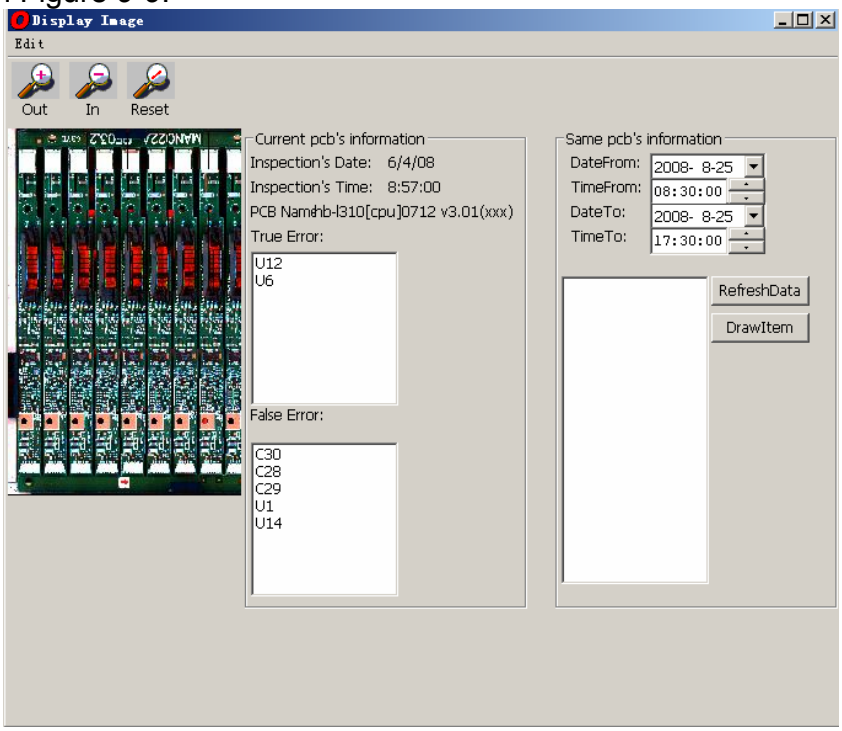


Figure9-9 Full Image of the selected record

With this dialog, user can position each detect which inspected on the current PCB selected in the record list or by barcode reader.

a) Display the position of the detected component. Select a detect in the list **True Errors** or **False Errors**, a red cross will position the detect in the image. User can also select a record then explore all the detects by pressing Space key.

b) By clicking **Zoom In** or **Zoom Out** button in the toolbar, user can zoom the image. Click the **Reset** button, the image can be reset to the original size. User can press letter "**o**" instead of clicking **Zoom Out**, and press "**i**" instead of clicking **Zoom In,** "**r**" instead of Reset.

c) If it is needed to change the color of the cross, which helps to position the detects, user can choose the menu item **ColorEditor**. And item **FontEditor** is to set font of the shown information, **LineHeight** is to set the thickness of the cross.

d) Set the period of time in the right by choosing date and time in for the **DateFrom**, **TimeFrom**, **DataTo** and **TimeTo**, select an item in the list, and click **DrawItem**, user can check the offsets of the detects.

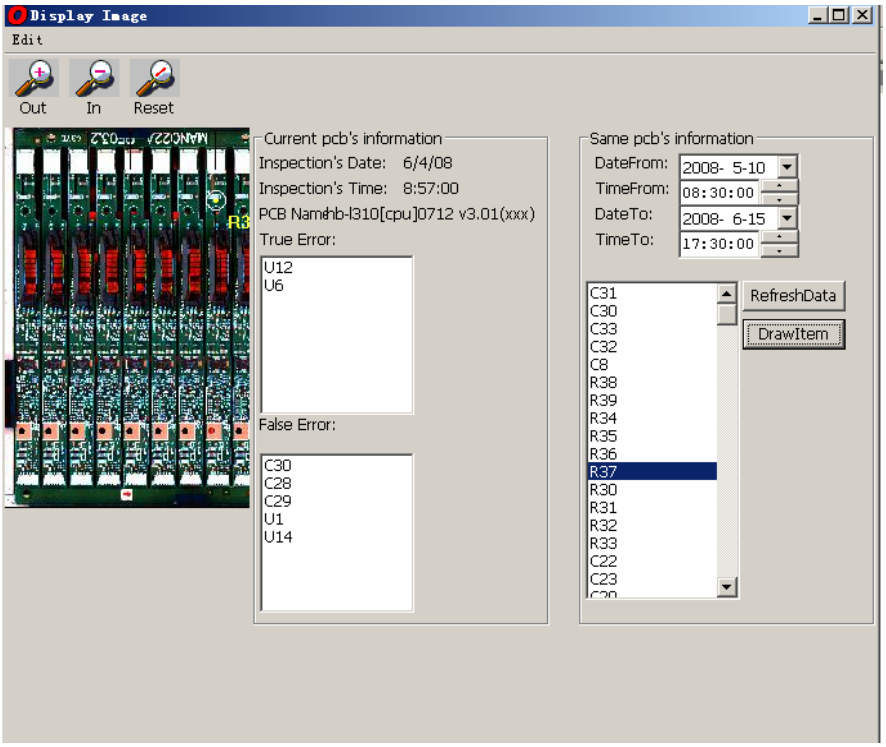


Figure 9-10

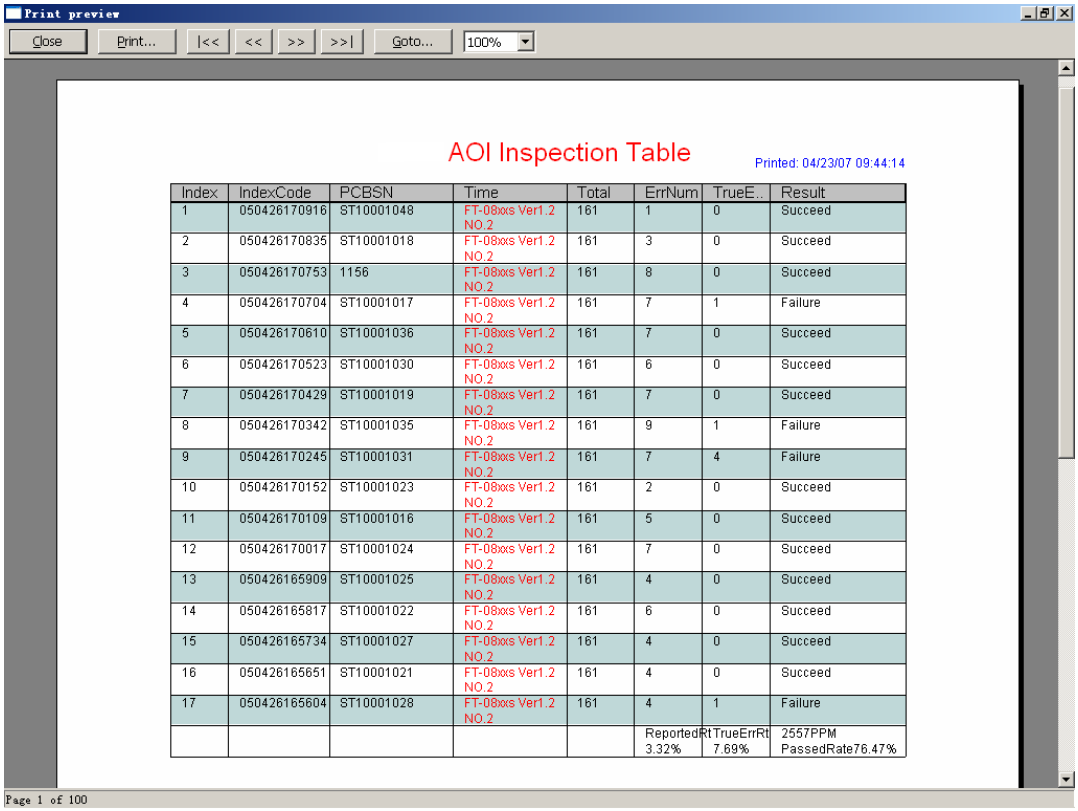
9.7 Report Print

SPC module provides four style reports, among which one is about inspecting details of each PCB, the others are for detect statistic.

Click on the record and select record in the data grid, or use **Ctr + Left** Button to select multiple records (Click **SelectAll** to select all records in the grid), then click the **PrintReport** button in

Result Processing, and a print dialog will pop up showing a report of all the selected records.

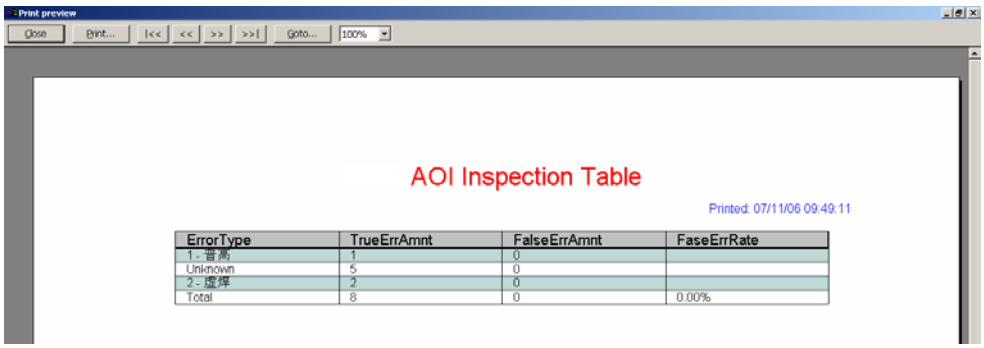
Shown in Figure 9-11.



Index	IndexCode	PCBSN	Time	Total	ErrNum	TrueE..	Result
1	050426170916	ST10001048	FT-08xxs Ver1.2 NO.2	161	1	0	Succeed
2	050426170835	ST10001018	FT-08xxs Ver1.2 NO.2	161	3	0	Succeed
3	050426170753	1156	FT-08xxs Ver1.2 NO.2	161	8	0	Succeed
4	050426170704	ST10001017	FT-08xxs Ver1.2 NO.2	161	7	1	Failure
5	050426170610	ST10001036	FT-08xxs Ver1.2 NO.2	161	7	0	Succeed
6	050426170523	ST10001030	FT-08xxs Ver1.2 NO.2	161	6	0	Succeed
7	050426170429	ST10001019	FT-08xxs Ver1.2 NO.2	161	7	0	Succeed
8	050426170342	ST10001035	FT-08xxs Ver1.2 NO.2	161	9	1	Failure
9	050426170245	ST10001031	FT-08xxs Ver1.2 NO.2	161	7	4	Failure
10	050426170152	ST10001023	FT-08xxs Ver1.2 NO.2	161	2	0	Succeed
11	050426170109	ST10001016	FT-08xxs Ver1.2 NO.2	161	5	0	Succeed
12	050426170017	ST10001024	FT-08xxs Ver1.2 NO.2	161	7	0	Succeed
13	050426165909	ST10001025	FT-08xxs Ver1.2 NO.2	161	4	0	Succeed
14	050426165817	ST10001022	FT-08xxs Ver1.2 NO.2	161	6	0	Succeed
15	050426165734	ST10001027	FT-08xxs Ver1.2 NO.2	161	4	0	Succeed
16	050426165651	ST10001021	FT-08xxs Ver1.2 NO.2	161	4	0	Succeed
17	050426165604	ST10001028	FT-08xxs Ver1.2 NO.2	161	4	1	Failure
					ReportedRt 3.32%	TrueErrRt 7.69%	2557PPM PassedRate76.47%

Figure 9-11

Choose data record(s) in the main frame, open the **Detect Statistic** dialog, click **Cmpnt-Amnt** button, and click PrintTable, and a **Print preview** frame will appear, as shown in Figure 9-12



ErrorType	TrueErrAmnt	FalseErrAmnt	FaseErrRate
1 - 普高	1	0	
Unknown	5	0	
2 - 虚焊	2	0	
Total	8	0	0.00%

Figure 9-12

Click **Err-Amnt** button, and click PrintTable, and a **Print preview** frame will appear, as shown in Figure 9-13.

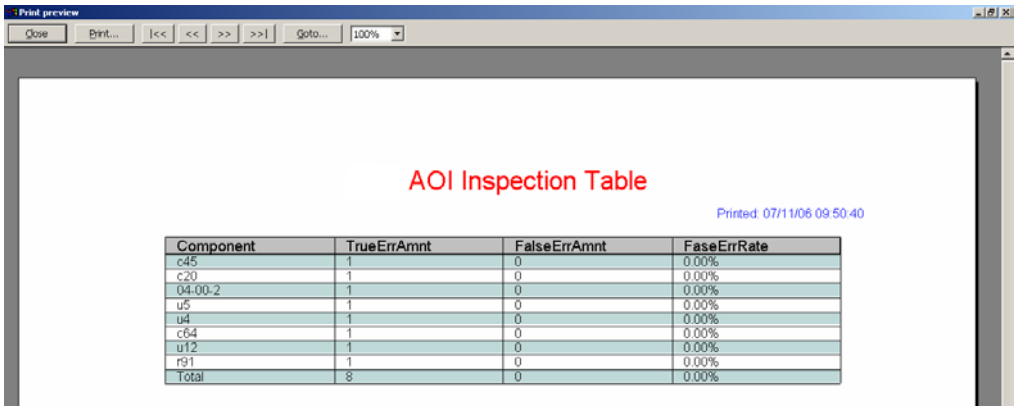
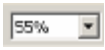


Figure 9-13

Click button in

to explore other pages, and choose a value in 

to zoom in and out the image display.

If printed report is needed, just click

to print the report.
Click

to quit and close the frame.

Chapter 10 User Management

10.1 User's Authority

This part is mainly used to manage users who use the system and their authorities. There are two types of users with different authority, regular user and administrator user. Administrator user has the authority to do all operations provided here in the software including train and inspection operation, but regular user only has authority to conduct inspection operation.

The main interface of the software is shown below in Figure 10-1.

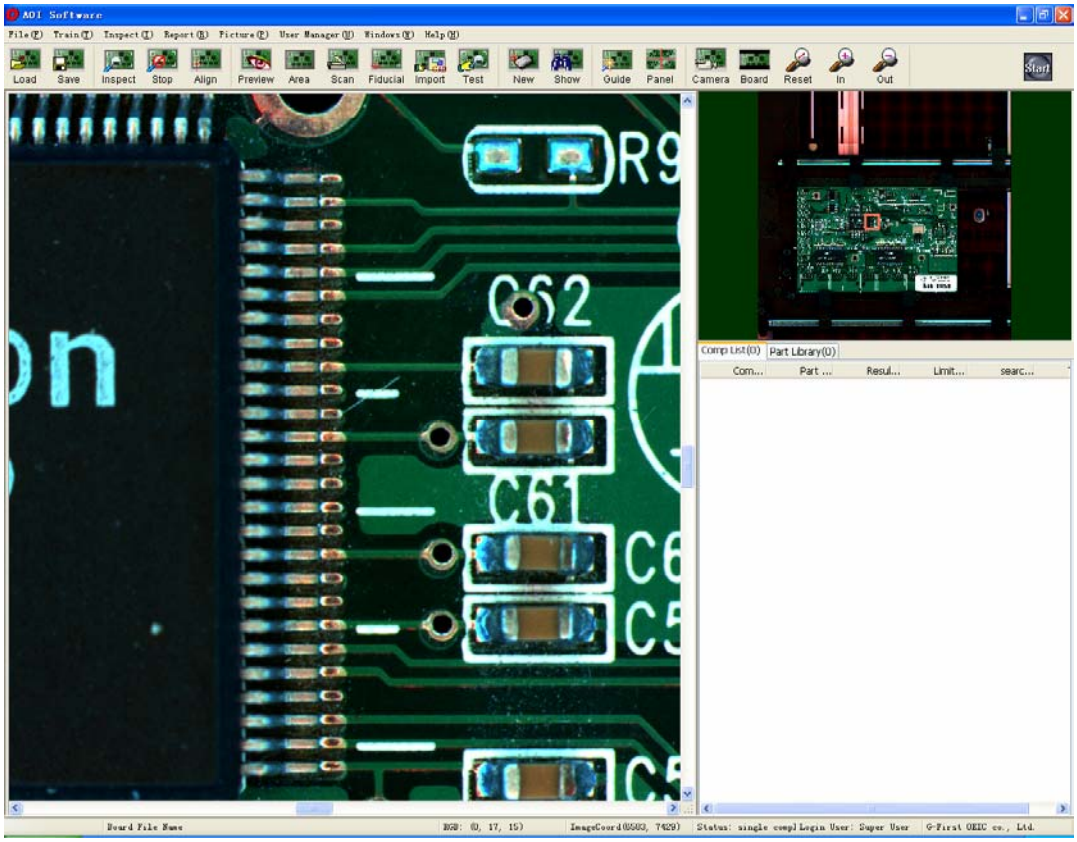


Figure 10-1

10.2 Add New User

After logging on the system, administrator user can click the **UserManager** menu in the main frame, and a dialog will pop up. User can manage user IDs with the interface to delete, modify or add user(s).

ADD: C2 BUILDING,LINPOSHAN INDUSTRIAL ZONE,SHANGLIAO VILLAGE,SHAJIN TOWN,
BAO AN DISTRICT,SHEN ZHEN CITY, GUANG DONG PROVINCE, CHINA.
Tel:0755-61176799 Fax:0755-61176795
Http://www.deksmt.com E-mail:dektec@vip.163.com

Click **CreateUser** button, and another dialog will apear, where user can add information to add a new user for the system.

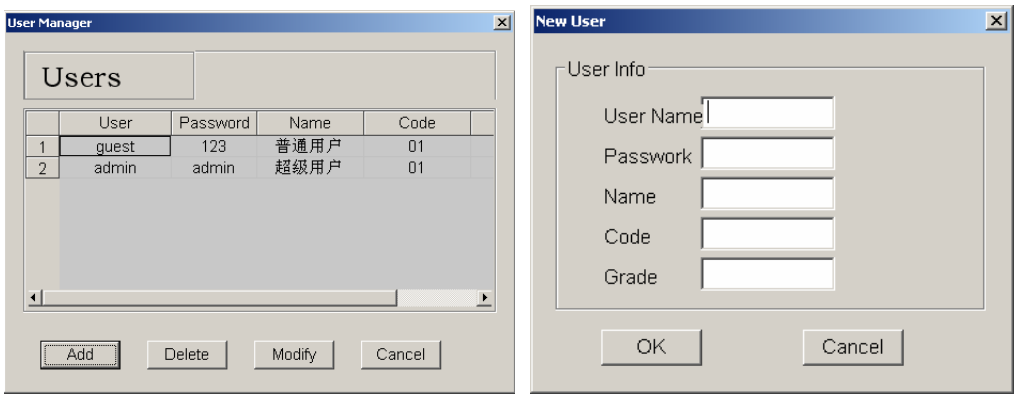


Figure 10-2

10.3 Delete User

Click **DeleteUser** button, and a dialog will pop up asking whether to delete the selected user, as shown in Figure 10-3.

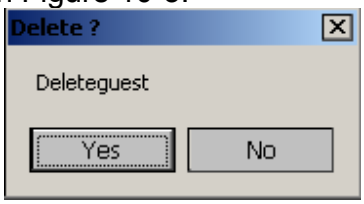


Figure 10-3

10.4 Modify User

Click **ModifyUser** button, and a dialog will pop up letting user to modify information of the selected user.

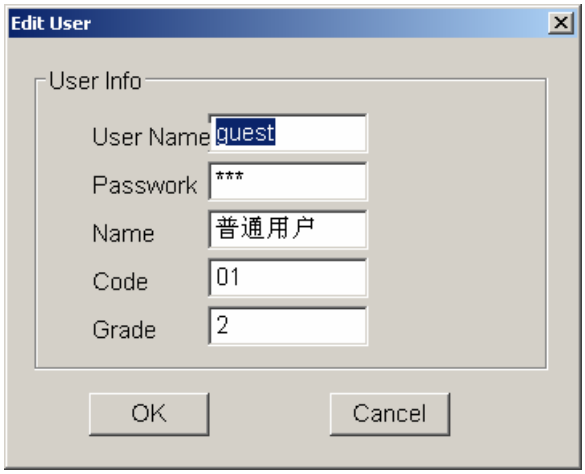


Figure 10-4

Chapter 11 Frequently Asked Questions

1 Q: After starting the software, the User Login dialog does not come out, in other words, after double clicking the AOI.exe under installation directory or using other method to start the software, the system has no response.

A: There are two cases leading to this phenomenon.

① Softdog. Check whether the softdog is properly inserted into the USB, or whether it is connected correctly. If there is nothing wrong with it, pull out the softdog and reinsert it into the USB.

② Capturing device. Check whether the power supply is switched on and correctly connected with the image-capturing device.

2 Q: A dialog of Can not find the fiducials pop up during aligning or inspection.

A: Right lick top fidu at the left-top corner, and select **Display fiducials** menu, then right click top fidu and select **Move fiducials**, move the anchor point to the correct position displayed earlier.

3 Q: After right clicking other three anchor points of the top fidu at the left-top corner, and choosing the Move fiducials menu, when aligning after moving, the moving operation doesn't work.

A: The top fidu at the left-top corner is the key anchor point, and other three points are regular points, user can only move the key anchor point to re-position the PCB.

4 Q: Unable to control the movement of stage through the software.

A: Check whether the power supply is switched on, or the COM wire is correctly connected, or whether the Exigency Stop button is pushed down. If the **Exigency Stop** button is pushed down, screw it out.

ADD: C2 BUILDING,LINPOSHAN INDUSTRIAL ZONE,SHANGLIAO VILLAGE,SHAJIN TOWN,
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Accessory Building CAD File

1. Main Interface (Figure 12-1)

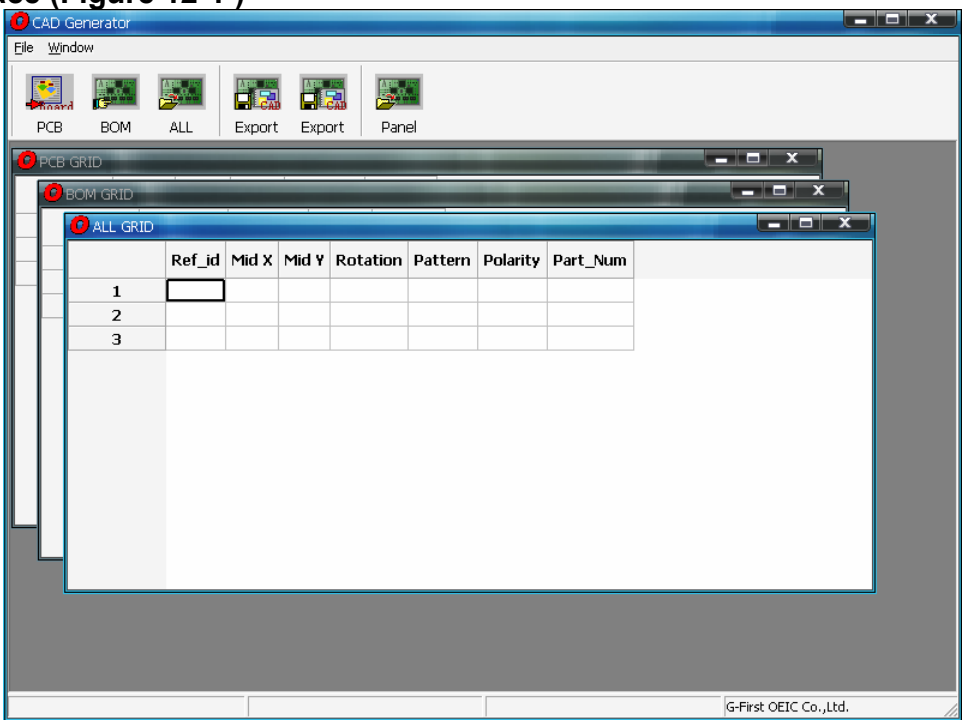


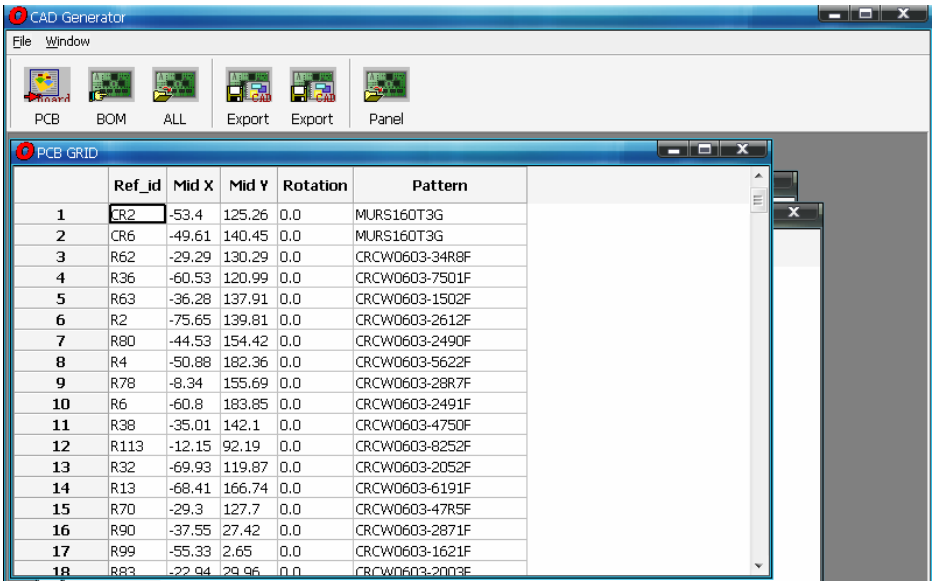
Figure 12-1

As shown in Figure 12-1, there are 6 tools in the toolbar including PCB, BOM, ALL，Preview, Export, Panel, and 3 tables including PCB GRID, BOM GRID, ALL GRID.

2. Make PCB table

Click PCB, and open the needed PCB data, and data will be read into the PCB GRID, as shown in Figure 12-2, then user need to edit the column name by left double clicking the name of the columns. After left double clicking the column name, a pop-up menu will appear, and then choose the proper name for it.

If there is any row that is not needed in the data, it should be deleted. User can right click the row name and choose DeleteRow to delete it.



	Ref_id	Mid X	Mid Y	Rotation	Pattern
1	CR2	-53.4	125.26	0.0	MURS160T3G
2	CR6	-49.61	140.45	0.0	MURS160T3G
3	R62	-29.29	130.29	0.0	CRCW0603-34R8F
4	R36	-60.53	120.99	0.0	CRCW0603-7501F
5	R63	-36.28	137.91	0.0	CRCW0603-1502F
6	R2	-75.65	139.81	0.0	CRCW0603-2612F
7	R80	-44.53	154.42	0.0	CRCW0603-2490F
8	R4	-50.88	182.36	0.0	CRCW0603-5622F
9	R78	-8.34	155.69	0.0	CRCW0603-28R7F
10	R6	-60.8	183.85	0.0	CRCW0603-2491F
11	R38	-35.01	142.1	0.0	CRCW0603-4750F
12	R113	-12.15	92.19	0.0	CRCW0603-8252F
13	R32	-69.93	119.87	0.0	CRCW0603-2052F
14	R13	-68.41	166.74	0.0	CRCW0603-6191F
15	R70	-29.3	127.7	0.0	CRCW0603-47R5F
16	R90	-37.55	27.42	0.0	CRCW0603-2871F
17	R99	-55.33	2.65	0.0	CRCW0603-1621F
18	R83	-22.94	29.96	0.0	CRCW0603-2003F

Figure12-2

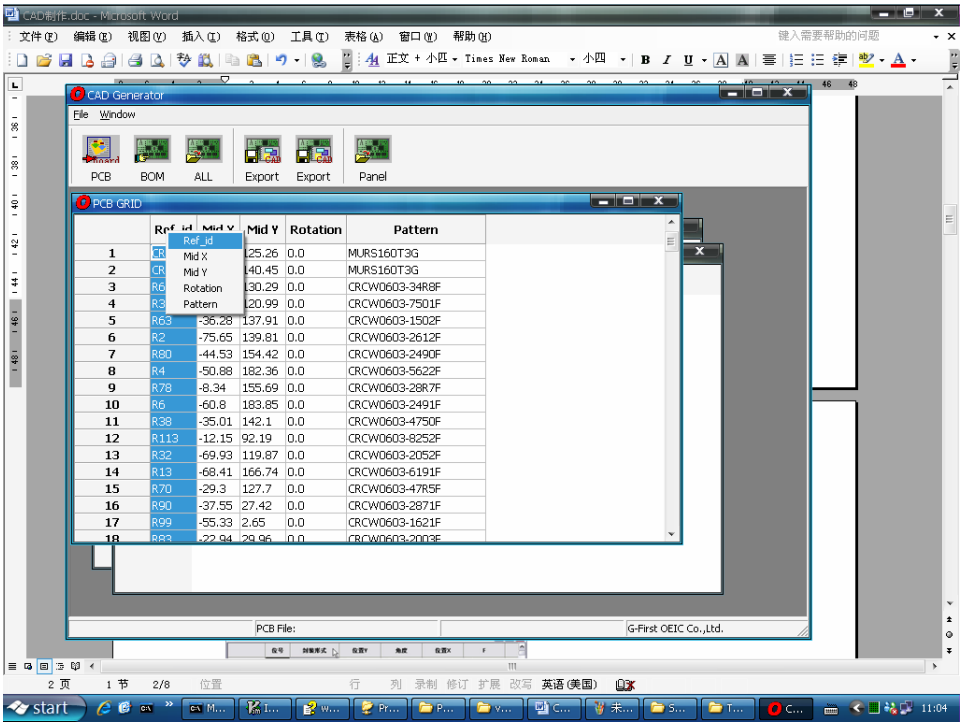


Figure 12-3

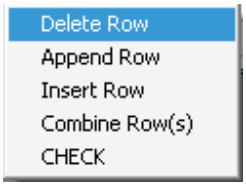


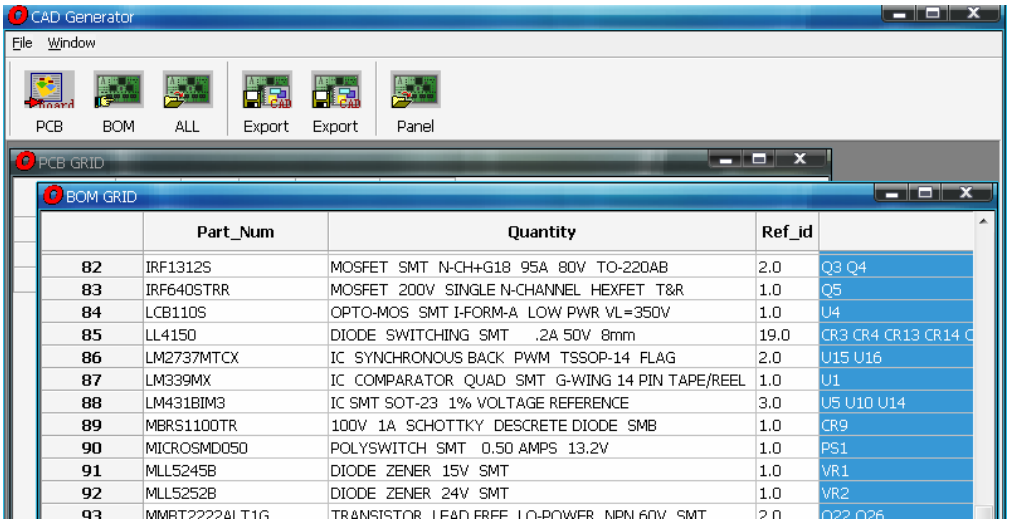
Figure 12-4

3 Make BOM Table

Click BOM, and choose the BOM file in the OpenFile dialog, then data will be read into the BOM GRID, as shown in Figure 12-5.

Then edit the column name as described above in 2. If a cell value in the polarity is not 1, it will be considered to be 0.

If there is any row that is not needed in the data, it should be deleted. User can right click the row name and choose DeleteRow to delete it.



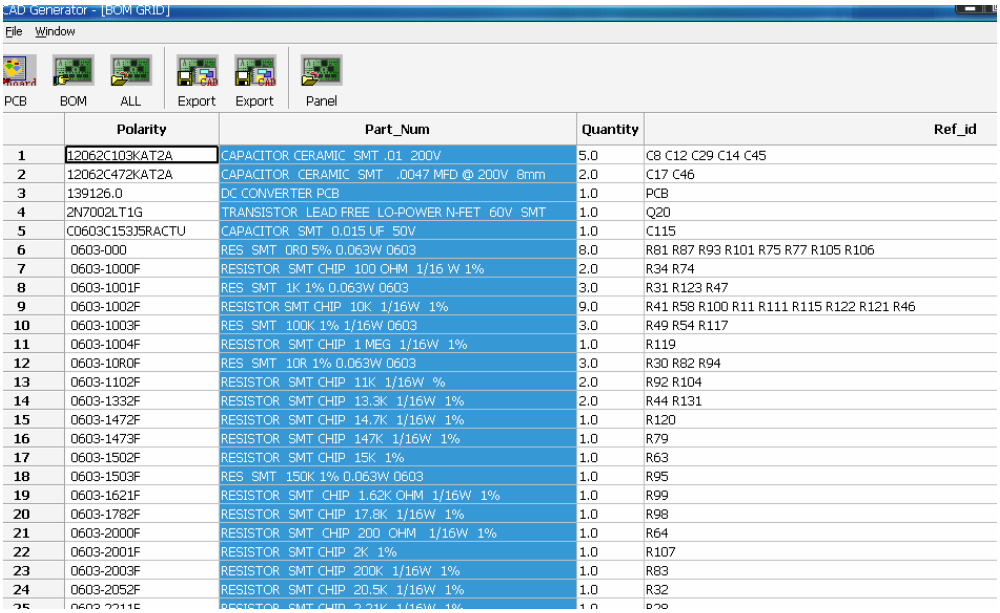
	Part_Num	Quantity	Ref_id	
82	IRF1312S	MOSFET SMT N-CH+G18 95A 80V TO-220AB	2.0	Q3 Q4
83	IRF640STRR	MOSFET 200V SINGLE N-CHANNEL HEXFET T&R	1.0	Q5
84	LCB110S	OPTO-MOS SMT I-FORM-A LOW PWR VL=350V	1.0	U4
85	LL4150	DIODE SWITCHING SMT .2A 50V 8mm	19.0	CR3 CR4 CR13 CR14 C
86	LM2737MTCX	IC SYNCHRONOUS BACK PWM TSSOP-14 FLAG	2.0	U15 U16
87	LM339MX	IC COMPARATOR QUAD SMT G-WING 14 PIN TAPE/REEL	1.0	U1
88	LM431BIM3	IC SMT SOT-23 1% VOLTAGE REFERENCE	3.0	U5 U10 U14
89	MBRS1100TR	100V 1A SCHOTTKY DESCRETE DIODE SMB	1.0	CR9
90	MICROSMD050	POLYSWITCH SMT 0.50 AMPS 13.2V	1.0	PS1
91	MLL5245B	DIODE ZENER 15V SMT	1.0	VR1
92	MLL5252B	DIODE ZENER 24V SMT	1.0	VR2
93	MMBT2222ALT1G	TRANSISTOR LEAD FREE LO-POWER NPN 60V SMT	2.0	Q22 Q26

Figure 12-5

4 Create CAD Table

After making the PCB table and BOM table, click Preview in the Toolbar, then you can see the some data appear in the **CAD GRID**, as shown in Figure 12-6.

Click Export to export the CAD table.



	Polarity	Part_Num	Quantity	Ref_id
1	12062C103KAT2A	CAPACITOR CERAMIC SMT .01 200V	5.0	C8 C12 C29 C14 C45
2	12062C472KAT2A	CAPACITOR CERAMIC SMT .0047 MFD @ 200V 8mm	2.0	C17 C46
3	139126.0	DC CONVERTER PCB	1.0	PCB
4	2N7002LT1G	TRANSISTOR LEAD FREE LO-POWER N-FET 60V SMT	1.0	Q20
5	C0603C153J5RACTU	CAPACITOR SMT 0.015 UF 50V	1.0	C115
6	0603-000	RES SMT 0R0 5% 0.063W 0603	8.0	R81 R87 R93 R101 R75 R77 R105 R106
7	0603-1000F	RESISTOR SMT CHIP 100 OHM 1/16 W 1%	2.0	R34 R74
8	0603-1001F	RES SMT 1K 1% 0.063W 0603	3.0	R31 R123 R47
9	0603-1002F	RESISTOR SMT CHIP 10K 1/16W 1%	9.0	R41 R58 R100 R11 R111 R115 R122 R121 R46
10	0603-1003F	RES SMT 100K 1% 1/16W 0603	3.0	R49 R54 R117
11	0603-1004F	RESISTOR SMT CHIP 1 MEG 1/16W 1%	1.0	R119
12	0603-10R0F	RES SMT 10R 1% 0.063W 0603	3.0	R30 R82 R94
13	0603-1102F	RESISTOR SMT CHIP 11K 1/16W %	2.0	R92 R104
14	0603-1332F	RESISTOR SMT CHIP 13.3K 1/16W 1%	2.0	R44 R131
15	0603-1472F	RESISTOR SMT CHIP 14.7K 1/16W 1%	1.0	R120
16	0603-1473F	RESISTOR SMT CHIP 147K 1/16W 1%	1.0	R79
17	0603-1502F	RESISTOR SMT CHIP 15K 1%	1.0	R63
18	0603-1503F	RES SMT 150K 1% 0.063W 0603	1.0	R95
19	0603-1621F	RESISTOR SMT CHIP 1.62K OHM 1/16W 1%	1.0	R99
20	0603-1782F	RESISTOR SMT CHIP 17.8K 1/16W 1%	1.0	R98
21	0603-2000F	RESISTOR SMT CHIP 200 OHM 1/16W 1%	1.0	R64
22	0603-2001F	RESISTOR SMT CHIP 2K 1%	1.0	R107
23	0603-2003F	RESISTOR SMT CHIP 200K 1/16W 1%	1.0	R83
24	0603-2052F	RESISTOR SMT CHIP 20.5K 1/16W 1%	1.0	R32

Figure 12-6

5 Other Functions

a) ALL: If the PCB component position information and BOM information are in

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one file, use this tool to import all the data into a grid.

ALL GRID

	Ref_id	Mid X	Mid Y	Rotation	Pattern	Polarity	P
1	CR2	-53.4	125.26	0.0	MURS160T3G	0	DIODE LEAD FREE ULTRA
2	CR6	-49.61	140.45	0.0	MURS160T3G	0	DIODE LEAD FREE ULTRA
3	R62	-29.29	130.29	0.0	CRCW0603-34R8F	0	RESISTOR SMT CHIP 34.8
4	R36	-60.53	120.99	0.0	CRCW0603-7501F	0	RESISTOR SMT CHIP 7.5
5	R63	-36.28	137.91	0.0	CRCW0603-1502F	0	RESISTOR SMT CHIP 15
6	R2	-75.65	139.81	0.0	CRCW0603-2612F	0	RESISTOR SMT CHIP 26
7	R80	-44.53	154.42	0.0	CRCW0603-2490F	0	RESISTOR SMT CHIP 24
8	R4	-50.88	182.36	0.0	CRCW0603-5622F	0	RESISTOR SMT CHIP 56
9	R78	-8.34	155.69	0.0	CRCW0603-28R7F	0	RESISTOR SMT CHIP 28
10	R6	-60.8	183.85	0.0	CRCW0603-2491F	0	RESISTOR SMT CHIP 2.4
11	R38	-35.01	142.1	0.0	CRCW0603-4750F	0	RESISTOR SMT CHIP 475
12	R113	-12.15	92.19	0.0	CRCW0603-8252F	0	RESISTOR SMT CHIP 82
13	R32	-69.93	119.87	0.0	CRCW0603-2052F	0	RESISTOR SMT CHIP 20
14	R13	-68.41	166.74	0.0	CRCW0603-6191F	0	RESISTOR SMT CHIP 6.1
15	R70	-29.3	127.7	0.0	CRCW0603-47R5F	0	RES SMT 47R 5% 0.063
16	R90	-37.55	27.42	0.0	CRCW0603-2871F	0	RESISTOR SMT CHIP 2.8

b) DIFF…:

Index: If the value is –1, it points to the last row; if it is 1, it points to the first row, and so on. **DELIMITER** means dividing the item with the input value.

Find\Diff: Means to find the input value, and seperate the item to other column.

c) Replace: After being clicked, a dialog will pop up. Fill the items required , and click OK, the specified characters in the column will be replace be the other character..

d) Add suffix: The **Find** is the targets to search, **Add** is what character to add. If **Prefix** is checked, the character will be added in front of the targets; and if Postfix is checked, the character will be added behind the targets.

e) CHECK : To check if the CAD table is created correctly.

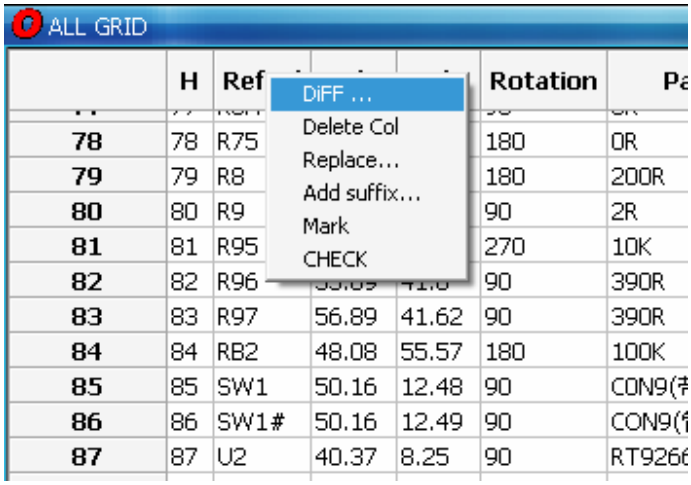

Figure 12-7